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ZX

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COMPUTING

Britain's Best Magazine For The Sinclair User

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and programs for the ZX Spectrum,
ZX81 and ZX80

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ZX CON

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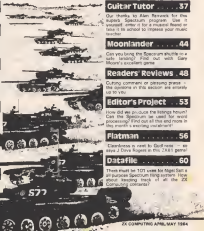
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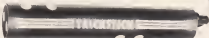
There must be 101 uses for Mgd Soft's all purpose Spectrum filing system. Here's our leading track of all the ZX Computing contents!



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Welcome

An anniversary

Two years ago this month I had my first close encounter with the British firm. The speed of development in the field of home computing has already created a generation gap and many old hands can be heard muttering I remember when...

Way back in the good(?) old days (1981) 20 computers were for the dedicated hobbyist, limited facilities in almost none reading underground publications and reading unfiltered information gathering were.

So Dave, then simply "Peter" Cox, changed all that with advice, the national prize for the 1981. The result of this flagrant approach was an increase in the available "hobby" magazines and they in turn began to cater for the users of the new machines.

I remember looking for these new publications lying at the back of the occasional specialist newsagents, the joy and excitement when one actually featured a ZX Spectrum title and it was bug ridden and mediocre - it was disappointing.

Then came the advent of the magazine for the "home computer user", but at first, catered for the machine one being for games players and the other with a bias toward programming.

A strange phenomenon was observed with these game oriented magazines - the programs for the other machines always look a lot better than the ones for your machine. The aim of the program converter was born.

All the stages of the proceedings, the latest of developments was personalized (owing to little differences and especially the infamous RAM pack problem, programmers tended to be possessed of infinite patience and almost mystical abilities).

Many names which were to become part of the legend of British computing were born at this stage, often in garages, back rooms and other unlikely places. Names to set the heart pounding, DR Tronics, Artic, MicroStar, to mention only a few.

I suppose commentators at present will be bemoaning the possibilities for high class pro-



gramming techniques (home business) was soon opened by the software houses.

Meanwhile, on the public side, the magazines had expanded and developed in two separate ways. Each of the makers of machines had at least one magazine and in the newspapers, they had emerged from behind the "mainstream" magazines and women's weeklies and taken over whole sections.

Soon the first colour, full page advert appeared. Tens of professional software had arrived, more computers, peripherals, peripherals, peripherals.

Today's programmer seems to be generally more demanding and less likely to accept delays and problems. Quite rightly too, we have now reached the age of mass production.

Although many business the reason for the level of the specialist is that of the "every home should have one". I continue to be excited by the expanding field of human ingenuity.

The launch of the ZX, the latest in the Sinclair range, shows the way that "old" I don't long for the "good old days" in the words of the well known Welsh comedian, I'm glad that "I was there".

(Excerpt from "A Banned View" by Ed)

Who and what

Seriously though this issue is something special. All our regular writers are here plus a few new names to grace the pages of ZX Computing.

We welcome all introductions Mike Edmunds who sees some

some of the educational software. Olive Smith who looks at the more unusual programs and Colin Chinnings, a man of many talents who checks out a musical box for the ZX81/Spectrum.

And of course, our readers who provide some of the best programs published. Try Calc table, a machine code game for any Spectrum which is entered by an easy BASIC program, Quasile, a comprehensive filing program or Super note, have you ever forced yourself to a building the Captain? Programs should for all games, games of logic or memory, utilities and hints and tips. Also review reviews - what more could you want? A competition! Of course!

This issue also was the result of my project to produce a clearer listing method and I'm sure you'll agree that they are much easier to read. This should mean less frustration and less chance of making an error when entering them. I tell you all about how it was set up at the time, and also how feasible it is to use the Spectrum for word processing.

Service with a smile?

Being a computer nut myself, I often phone companies as a private individual and not in my capacity as editor. There seems to be a wide range of attitudes between companies and, in general, this tends to reflect on their product.

The next time you decide to spend your well earned cash on their ingenious (and/or overpriced) bit of magic, try giving the company a phone call first to ask for

more details. You'll get a good idea of the product from the attitude they adopt on the phone!

I think this has to do with my comments on the development of the market, there are many who are meeting the challenge and are full of enthusiasm and energy but unfortunately some are still in the back room days.

Contributions

We are always on the lookout for good programs and articles for future issues of ZX Computing, and while better to have than to not have material. It's when reading through the magazine, when you can read programs as well as better than, our present contributors, then let's hear from you.

All contributions are, of course, paid for at very competitive rates. So if you've got your eye on a new ZX and in you'd just like to supplement your pocket money, get writing! It is vital though that all the programs you send us are totally original and not "borrowed" or adapted from other magazines or books. (When Tim Harpell was writing in the Editor's office he even received "original" contributions he himself had written for his own book!).

Any kind of program (business, domestic, educational, or just fun) will be welcomed, but particularly those which use ZX BASIC in clever and efficient ways or those which employ certain routines which can be re-used on other programs.

Program listings are also along with a clear explanation of how the program is constructed, must be provided. The user can request to see once the program is RUN is a screen dump is particularly valuable in this respect. When submitting Spectrum programs, it is very important to remember to include a cassette of the program as well as the listing, as this will allow us to check the program before publication.

The last word

Enough of the introduction, on with the show!

Ray Biles

Home and bit?

Dear ZX Computing,

It was great to see the program Home Base, published in the February issue of the magazine. However, I have noticed a couple of small faults which I would like to correct.

In line 5, the GO TO B can be of course be omitted as line B comes next anyway! A more serious fault occurs on line 20226 where it reads 7 and not 8. The correct line should be

```
LET B=B+1 IF D=8 THEN
GO TO 20208
```

This error means that there would be no level 7. I hope the editor will accept my apologies of the game and apologise.

Yours faithfully,
David Meyer
Leeds

Don't get the hump!

Dear ZX Computing,

Thank you for the review of our utility, Group force 28,901 in the December issue of ZX Computing, but you gave us the wrong name! To avoid confusion, it should be Camel Motion (not software) at 204 Corporation Ltd, Weymouth, Dorset.

Could we also mention that, irrespective of your suggestion, a separate User Guide with fully worked examples should now be available. This will complement the reference manual provided with the cassette.

Yours faithfully,
J.R. Eustace
Weymouth



Ins and outs of Nuclear Attack

Dear ZX Computing,

I'm sure that many of your readers who typed in the Nuclear Attack game in the October issue will have had trouble with their keyboards and firing. This is because the keyboard scanning system which the author used does not give the same result in all systems. He is not alone, some commercial companies have slipped up on this.

The command which is causing all the problems is the IN function and one program published which uses this is likely to give some people problems. The easiest way to change your program is to check the value returned by the IN function when a key is pressed: the value returned by the program is 255, but mine returned 191.

To check enter the following line:

```
STOPPRINT AT 0 GUN 88378:
GO TO 83000
```

You can have the original program in the computer while you do this if you wish, and type GO TO 83000 on-line. The number displayed at the top of the screen is the default or base value; pressing any key on the left-hand half of the bottom row will cause this value to be displayed to change.

Once you know the base value and the specific value for particular keys then you can adjust the control values accordingly. Replace 88378 with each of the numbers used in the program. Note 88000 is checked but not used — probably left over from an earlier version and can be left out. I find out the values for specific keys and then enter lines 134,880,1010 to 1020 as follows:

As is usual, a and y are the horizontal and vertical scales. The next input, "g", represents half the number of sides of the spiral. For example, if $g = 3$ gives a four-sided spiral, if $g = 2$ gives three-sided spiral, if $g = 4$ gives a spiral which is a combination of the square



Here are my alterations based on the base value of 191. If this is the number which your Spectrum produces then you only need to make these changes: 135 and 880 to

```
IF IN 88278=IN 84510+IN
87342+IN 48185<784
THEN GO SUB 83000
```

Delete lines 1010 to 1020 as useless and replace with

```
1010 LET x=y=IN 88000-
187480<255-IN 84510-
188 AND y=2
1020 LET y=y-IN 87342<
181 AND y=3+IN 48185<
181 AND y=4
```

After line 2050 to

```
2050 IF IN 88278<181 THEN
GO SUB 83000
```

I hope that this will help you to get this and other programs working and I would like to see that every one of the 100 or so I think ZX Computing offers the best value, interest and original value of any of the magazines on the market.

Yours faithfully,
A. Harman
Somerset

Round and round

Dear ZX Computing,

I enclose a short program which draws Spirals. Usually you input 1 for the x and y values but if you enter a greater or lesser number than the pattern drawn is bigger or smaller.

```
10 INPUT "X,Y"
20 INPUT "A NUMBER PLEASE"
30 PLOT 100,0
40 FOR A=0 TO 360 STEP 1
50 DRAW "A" IN "A"
60 NEXT A
```



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It is left to the reader to decide whether the author's use of the term "cognitive" is justified. However, the author's use of the term "cognitive" is not justified in the context of the study.

[illegible]

1976). The Journal of Music in 1976 was published bimonthly. It is planned that the Journal of Music in 1977 will be published monthly. The Journal of Music in 1978 will be published bimonthly.



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An amazing arcade game from Gavin Smyth of Londonderry. A must!!

Galac



All hail! A program that over comes the problems of the space invaders game of Spectrum 48K. This machine code space invaders-type game occupies just over 1K and so will run on either the 16K or 48K Spectrum. This is not an attempt to teach machine code programming, but with the instructions given, anyone can run the program without having to understand it.

The object of the game is to destroy the eight coloured alien-like randomly moving about the screen, stopping them at the time. Naturally you have to hit them dead on, but if it lands between your gun and it, bang! If you are innocent, you only lose a life, not the whole game. To begin with, the game is very slow; the gun moves at eight times the speed of an invader but after you have hit one off the first three without firing, the remaining aliens move at a third of the game speed — to get the last one, you have either to be pretty quick or very lucky! After this, you get another alien outside each hit, but the game does not normally last for more than three screens of alien.

The aim of the program

There are several reasons for writing this program:

1 To make a game less predictable than the familiar figure marching across the screen in neat rows. This randomness adds to the difficulty keeping games short and interesting; those shoot-offs where the space invaders machine all moving.

2 To keep the pace and excitement of the way by making the game colourful, easy to control and totally unconfusable (cannot lose level). The controls are Z for left, X for right

and space to fire. There is a return to 84500 in the program (to prevent loss of "lives" if they've stopped moving!) as the only way to clear the screen forever is to pull the plug out — but beware, the game is addictive.

3 To cause endless frustration with the game, continuous rising and high scores not lost in three figures. (My best is three more quarter century into the 21st century can clock up to 8888.)

4 Finally, to show how the Spectrum ROM can be used to simply programming by performing the more fundamental duties such as printing.

Interesting routines

Here are a few of the techniques used in the program to get a lot out of the machine without typing too much in:

RANDOM NUMBERS. The suboutine RND (address 320160) returns a fairly random number in the A register. When it does it also a pointer through the ROM and return the value of that location (random enough for this purpose although there is a distinctly non-random region) an unused region of over 1K, starting at 144480, where all the memory locations contain 255. This provides an interesting shoot game every three shots or so when the aliens move uniformly without dropping bombs and with a distinct sound, but they are still just as frustratingly tricky to hit.

SCORES. The suboutine S&RPF (316770) is used to print a score

don't short here. It is then simply to store the program a little, it can be slowed and more by increasing the value of 25 in this routine (equivalent to P0000) a larger number of locations (158830). This routine calls the ROM suboutine S&RPF (8470) which controls the Superduper. This is one of the few routines that controls the 18 register pins, hence the PUSH 04 and POP 18 near it in the program in place.

To use S&RPF, 04 should contain a number equal to 16 (the number of characters) and 18 should contain 1614376000 frequency 30 17000. For example, to play the note A 440Hz for 3-8 seconds:

```
DE contains 1614400 J 50 = 17000
16, contains 161437600/440 = 36 120 = 3624
```

INVADER CONTROL. The 04 register pair is used to hold the start of the individual invader databases, greatly simplifying code since, for example the invader values is always (X - 1) regardless of the invader being used.

Graphics galore

The remainder of the routines deal with graphics.

CLS (34380). This routine

simply clears the screen.

BORD1 (88880). This sets the border to the colour contained in the A register. For example, to set a red border 21 border.

```
LD A, 2
CALL BORD1
```

CHAMPION (85130). Before writing to the screen, it must be opened for printing. The upper screen is channel '0' with code 2, so is prepared for printing.

```
LD A, 2
CALL CHAMPION
```

PRINTNG (83830). This prints a string of characters of length 80 which starts at the address contained in DE. For example, to print the word "Invader" which is held in the ROM at 84800:

```
LD DE, 84800
LD BC, 8 length of word
CALL PRINTNG
```

OUTNUM1 (80530). This routine prints out the integer contained in BC, it is used to print the numbers. The number must be positive and less than 10000.

No check has been made for overflow of the type since it is unlikely that such a score will be reached.

CLUT (35460). There are two

toids



time to move the print out file. One is to use the AT code (224), followed by position with PAPER0 as PRT 10. This method is used in the PRT0 routine, address 32034d. The other method is to use CLST for this. It contains 34d spc/C contains 33d-column. For example

```
PRINT AT 8,0 (is equivalent to
LD B,19d (234 5)
LD C,33d (233 6)
CALL CLST
```

They will notice that PRT 10 occurs frequently in the program — this calls the main printing routine, which displays the character with code held in A. It will cope with any character, including tokens, paper and ink controls and position controls. For example, to print a old "C"

```
LDA A,18d (8d, control code
PRT 10
LD A,1 (control code for blue
PRT 10
LD A,18d (code for "C")
PRT 10
```

The subroutine MAINPRT (31705d) takes care of setting up some system pointers

LOG: Rather than move all the data for the graphics characters into the area defined here, the program changes the system variable LOG (23876d) to

point to the graphics data at the end of the program. If Melsen had said I come to the moon-lands!

ATTN: Leading location 20350d with 7 is equivalent to PAPER0 (8d, 7). In general, this system variable contains

```
FLA 2H*122d + 20350H*
64 d + PAPER*8 + 8d
```

MAINOP (Leading 23854d) with 2035d is equivalent to PRT 0 PAPER 0 (FLASH 0)

BRIGHT 0 — setting ink and paper to transparent so that screen colour will not be affected by anything printed — the alternative to this would be complex colour controls before each print

There is also a general listing of the whole program (see listing 6)

Most of the information on ROM routines was found in Dr Ian Logan's book, "Understanding your Spectrum", which contains a lot of valuable information on other routines and machine code for the Z80

Typing it in

We repeated the listing of this program in 601, 602, 603 and 604. Mathematics and ROM form unfortunately (the rest is 18 pages). The present form was obtained by a program which copied the lines in listing 1 by PERKING at the code from the top of the program supplied

Each line of the listing consists of ten DATA bytes (plus a checksum to help ensure that errors are eliminated). The method of entering these codes

```
10 DATA 208,230,123,208,7,123
,208,64,123,33,1314
20 DATA 81,123,8,8,58,78,123,
167,40,87,770
30 DATA 58,75,123,167,40,61,7
4,35,66,35,776
40 DATA 229,197,213,231,235,2
21,126,1,167,40,1640
50 DATA 40,303,303,121,221,22
9,6,8,33,86,1147
60 DATA 123,84,33,84,33,229,1
97,213,231,235,1660
70 DATA 221,126,1,167,40,9,30
5,131,121,203,1236
80 DATA 121,123,203,166,121,1
93,223,16,223,221,1647
90 DATA 323,193,223,16,183,24
,178,33,78,123,1282
100 DATA 52,17,64,0,33,0,33,30
9,181,3,587
110 DATA 24,160,208,176,122,24
,152,221,126,0,1200
120 DATA 204,21,193,205,27,124
,42,73,123,43,1186
130 DATA 34,73,123,203,208,123
,201,221,126,0,1316
140 DATA 53,78,123,190,192,221
,126,1,33,190,1192
150 DATA 204,208,123,201,221,1
36,5,204,21,193,1205
160 DATA 221,70,6,58,76,123,26
5,167,121,203,1274
170 DATA 184,124,201,61,184,20
4,37,124,40,184,1335
180 DATA 204,27,124,40,184,204
,27,124,201,203,1360
190 DATA 1,123,208,249,124,221
,126,6,167,178,1618
200 DATA 118,124,203,179,123,2
03,223,124,22,80,1274
210 DATA 123,167,176,180,124,2
01,23,74,126,34,1320
220 DATA 123,93,62,7,33,141,93
```

```

,117,42,212,788
230 DATA 29,117,179,203,120,24
,59,120,72,121,1124
240 DATA 237,79,230,31,103,24,
119,72,201,179,1314
250 DATA 90,73,120,42,4,50,79,
120,200,107,877
260 DATA 12,42,2,200,1,32,17,1
77,179,1,401
270 DATA 32,0,200,40,32,1,4,24
,200,217,781
280 DATA 13,237,79,71,120,209,
27,24,17,177,893
290 DATA 120,1,1,32,0,200,40,32
,60,191,219,1028
300 DATA 224,230,1,32,240,201,
200,107,13,42,1203
310 DATA 2,200,1,32,17,103,120
,1,32,0,200
320 DATA 200,40,32,1,9,24,200,
217,13,237,787
330 DATA 79,71,179,209,27,24,1
,24,24,200,788
340 DATA 217,13,237,79,73,120,
200,27,24,1,777
350 DATA 19,24,200,217,13,237,
79,79,120,4,777
360 DATA 0,200,27,24,32,0,40,4
2,7,4,494
370 DATA 120,119,32,14,200,41,
274,2,32,240,1144
380 DATA 42,0,50,79,120,33,81,
120,4,0,572
390 DATA 74,32,44,30,213,221,2
20,170,221,119,1404
400 DATA 4,221,112,0,221,52,0,
200,24,120,788
410 DATA 230,2,42,221,119,4,20
5,24,120,230,1293
420 DATA 19,179,0,221,119,1,14
,219,42,7,464
430 DATA 90,79,120,179,20,40,1
39,201,17,189,1084
440 DATA 120,1,12,0,200,40,32,
27,22,09,888
450 DATA 17,33,44,4,42,200,213
,197,200,44,1124
460 DATA 120,1,1,27,2,119,237,1
74,241,240,47,1320
470 DATA 230,7,40,103,200,24,1
20,112,17,14,730
480 DATA 0,200,181,2,173,200,2
27,14,220,33,1267
490 DATA 0,40,17,90,0,200,181,
3,201,220,754
500 DATA 124,0,221,119,2,221,1
24,1,221,119,1124
510 DATA 3,200,44,120,230,19,3
2,19,200,24,742
520 DATA 120,220,2,22,0,221,83
,0,24,3,494
530 DATA 221,82,0,221,124,4,22
1,124,1,221,1201
540 DATA 119,1,204,1,40,19,204
,30,40,10,740
550 DATA 221,124,0,147,40,3,20
4,21,200,24,1089
560 DATA 12,221,124,2,221,119,
0,221,124,3,1081
570 DATA 221,119,1,221,124,1,2
54,2,204,120,1267
580 DATA 123,204,29,204,120,12
3,200,24,179,230,1447
590 DATA 19,204,120,123,221,12
4,4,147,193,200,1277
600 DATA 24,123,230,1,193,221,
124,4,221,119,1291
610 DATA 0,221,124,1,221,119,4
,201,221,124,1247
620 DATA 4,237,40,221,119,4,20
1,200,189,123,1371
630 DATA 33,79,120,42,137,217,
274,220,1,32,1129
640 DATA 19,29,40,120,147,22,9
,124,50,00,740
650 DATA 120,42,21,50,79,120,1
24,50,77,120,440
660 DATA 42,204,219,204,200,87
,32,1,32,230,1394
670 DATA 2,32,1,33,124,204,4,4
0,1,204,749
680 DATA 27,179,80,77,120,119,
201,200,44,120,117
690 DATA 244,10,17,14,0,30,1,1
1,221,237,894
700 DATA 209,181,3,221,220,201
,32,79,129,83,1322
710 DATA 42,147,221,79,0,221,7
9,1,200,73,1070
720 DATA 124,179,221,119,1,20,
80,120,42,73,1010
730 DATA 120,32,34,79,120,80,7
2,120,100,40,870
740 DATA 7,24,11,34,71,120,24,
4,30,71,442
750 DATA 120,189,84,240,1,24,2
4,200,217,42,1101
760 DATA 237,79,73,120,200,27,
24,1,0,24,798
770 DATA 200,217,13,237,79,71,
120,200,27,24,1261
780 DATA 201,89,74,120,4,21,79
,42,144,200,877
790 DATA 73,124,1,19,24,200,21
7,13,33,79,783
800 DATA 120,83,4,0,79,200,27,
24,42,23,404
810 DATA 210,50,79,120,210,50,

```

80, 129, 219, 42, 1232
 839 DATA 32, 219, 179, 59, 93, 129,
 201, 223, 329, 245, 1273
 859 DATA 197, 4, 21, 120, 50, 77, 12
 9, 197, 197, 69, 1049
 949 DATA 159, 309, 239, 134, 193, 2
 41, 249, 197, 309, 309, 1970
 990 DATA 129, 99, 77, 129, 71, 14, 2
 32, 192, 209, 14, 1119
 999 DATA 129, 241, 221, 209, 179, 2
 69, 159, 34, 209, 194, 1772
 999 DATA 124, 301, 42, 22, 219, 221
 , 134, 9, 219, 221, 1412
 999 DATA 124, 4, 219, 42, 32, 219, 2
 21, 32, 3, 42, 999
 999 DATA 22, 219, 221, 124, 5, 219,
 221, 124, 4, 219, 1372
 999 DATA 42, 104, 219, 201, 33, 79,
 129, 42, 22, 219, 1149
 999 DATA 124, 219, 59, 90, 129, 219
 , 42, 32, 219, 59, 1191
 999 DATA 40, 13, 42, 32, 219, 124, 2
 19, 59, 90, 129, 999
 999 DATA 219, 42, 193, 219, 201, 17
 2, 50, 90, 129, 201, 1477
 999 DATA 42, 22, 219, 221, 124, 9, 2
 19, 221, 124, 4, 1219
 999 DATA 219, 42, 32, 219, 179, 221
 , 119, 4, 201, 209, 1491
 999 DATA 34, 129, 39, 2, 32, 4, 209,
 99, 129, 209, 937
 999 DATA 31, 99, 209, 191, 3, 209, 9
 4, 129, 209, 199, 1241
 999 DATA 34, 201, 59, 77, 129, 4, 21
 , 77, 209, 14, 999
 999 DATA 129, 59, 79, 129, 4, 21, 77
 , 42, 144, 209, 991
 1000 DATA 34, 129, 201, 221, 79, 2, 2
 21, 79, 3, 209, 1149
 1000 DATA 34, 129, 221, 79, 0, 221, 7
 9, 1, 42, 147, 939
 1000 DATA 209, 34, 129, 201, 42, 32,
 219, 129, 219, 121, 1270
 1000 DATA 219, 42, 9, 219, 4, 4, 42, 3
 2, 249, 219, 1044
 1040 DATA 241, 14, 201, 201, 749, 42
 , 22, 209, 129, 219, 1049
 1090 DATA 121, 219, 42, 9, 219, 241,
 749, 219, 241, 40, 1423
 1040 DATA 249, 219, 241, 40, 219, 20
 1, 129, 42, 119, 72, 1459
 1070 DATA 32, 42, 42, 144, 199, 34, 1
 19, 92, 124, 229, 1092
 1090 DATA 221, 9, 0, 0, 0, 9, 0, 0, 3, 0
 , 212
 1099 DATA 0, 77, 129, 104, 129, 111,
 129, 119, 129, 129, 1099
 1109 DATA 129, 132, 129, 129, 129, 1
 49, 129, 0, 0, 0, 917

1119 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 1139 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 1159 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 1140 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 1190 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
 1160 DATA 0, 0, 0, 32, 0, 0, 32, 93, 47
 , 79, 293
 1179 DATA 92, 49, 32, 49, 32, 32, 32,
 32, 74, 109, 949
 1190 DATA 119, 191, 119, 32, 92, 32,
 77, 73, 93, 47, 749
 1190 DATA 79, 42, 49, 32, 49, 22, 11,
 11, 71, 93, 499
 1200 DATA 77, 49, 32, 79, 94, 49, 92,
 22, 4, 13, 521
 1210 DATA 79, 79, 94, 49, 49, 49, 92,
 93, 92, 13, 439
 1220 DATA 13, 32, 32, 32, 32, 32, 40,
 90, 42, 32, 417
 1230 DATA 109, 111, 119, 191, 119, 3
 2, 109, 201, 102, 119, 1013
 1240 DATA 13, 32, 32, 32, 32, 32, 40,
 69, 42, 92, 419
 1250 DATA 109, 111, 119, 191, 119, 3
 2, 114, 109, 103, 104, 1013
 1260 DATA 114, 13, 32, 32, 32, 32, 40
 , 93, 40, 47, 949
 1270 DATA 42, 32, 102, 109, 114, 101
 , 109, 13, 13, 32, 499
 1280 DATA 32, 90, 114, 101, 119, 119
 , 32, 60, 49, 79, 799
 1290 DATA 94, 49, 92, 42, 32, 114, 11
 1, 32, 99, 129, 797
 1300 DATA 109, 109, 119, 13, 13, 13,
 13, 13, 147, 144, 479
 1310 DATA 149, 32, 32, 193, 32, 194,
 32, 193, 32, 32, 931
 1320 DATA 130, 191, 193, 32, 32, 130
 , 191, 193, 32, 32, 1034
 1330 DATA 193, 32, 194, 32, 193, 32,
 32, 147, 149, 149, 1032
 1340 DATA 0, 0, 1, 0, 4, 31, 31, 254, 4
 0, 259, 499
 1350 DATA 70, 34, 124, 259, 199, 24,
 0, 0, 129, 0, 949
 1360 DATA 32, 249, 204, 127, 9, 26, 3
 4, 49, 1, 102, 941
 1370 DATA 24, 0, 0, 124, 219, 193, 29
 9, 199, 124, 40, 1139
 1380 DATA 24, 34, 47, 129, 129, 74, 4
 9, 0, 234, 30, 749
 1390 DATA 0, 21, 224, 7, 34, 192, 199
 , 44, 34, 129, 979
 1400 DATA 129, 34, 44, 129, 1, 29, 22
 4, 7, 249, 0, 979
 1410 DATA 120, 7, 0, 24, 49, 49, 49, 2
 4, 40, 0, 419
 1420 DATA 109, 40, 34, 34, 49, 124, 4
 0, 0, 0, 0, 499

are slightly different for the 1B and 48K Spectrums.

48K Enter both listings, 1 and 2a and RUN the program; correct any errors that are reported.

16K Do not enter listing 1 but enter listing 2a and RUN the program, enter each of the 11 numbers in each DATA line one number at a time. If you make a mistake the program will tell you and you will need to re-enter that line.

Saving

Before testing the program it **MUST** be saved on tape. Even though we have taken great pains to foolproof the entering system it is still possible for an error to slip through!

First, narrow the BASIC listing. If you entered it in the 48K mode make a copy on tape just in case by using **NEW** — the machine code is quite safe — then enter listing 3. To save both the loader and this enter **GOTO 40**, enter the tape and press and key. After a few seconds the "start tape" message appears again, press another key and the tape will be saved. Verify both versions by **VERIFY** "Y" and then **VERIFY** "C" code.

To start the game either reload it from tape or enter **RANDOMISE USA 31000**. If all is well the instructions will be displayed and look out!

If it crashes then switch off, enter listing 4, RUN, reload the program and check each number until you find the

mistake and forgetting to change the last number of each DATA line. **POKE** the address

given with the correct number. Now follow the saving procedure again.

```
LISTING 2a
1000 REM ** 48K LOADER **
2000 CLEAR 30000: RESTORE
3010 FOR I=31000 TO 32417 STEP 1
40 LET J=0
5000 FOR J=0 TO 7: READ A: POKE
  I+J,A: LET C=C+A*HEX J
6000 READ A: IF A=0 THEN CLS
  : PRINT FLASH LINE# AT LINE
  : I+30000: FLASH 0: STOP
7000 NEXT J
```

```
LISTING 2b
1000 REM ** 16K LOADER **
2000 CLEAR 30000: RESTORE
3010 FOR I=31000 TO 32417 STEP 1
40
5000 LET J=0: FOR J=0 TO 9: INPUT
  T A: POKE I+J,A: LET C=C+A*HEX
  J
6000 INPUT A: IF A=0 THEN CLS
  : PRINT FLASH LINE# AT LINE
  : I+30000: FLASH 0: GO TO 3000
7000 NEXT I
```

```
LISTING 3
1 REM ** INITIAL PROGRAM **
10 CLEAR 30000
20 LOAD ** CODE
30 RANDOMISE USP 31000
40 SAVE "galactic" LINE 30
50 SAVE "eq" CODE 31000,1418
```

```
LISTING 4
1 REM ** CHECKING PROGRAM **
5 CLEAR 30000: LOAD ** CODE
10 FOR I=31000 TO 32417
20 PRINT "Address=";I;"=";PEEK
  I
30 NEXT I
```

START Call MAINPRM Set system variables, random number pointer

MOVE Call MOVGAME Reset scores, invaders, print instructions, with until ENTER is pressed

SCALER Call SETUP Print scores, invaders, final set screen attributes in bands of offscreen lines

MAINLOOP For each invader — Test lives, if none, GOTO INCDRAWN

Call UPDATE Call MOVPRM: 1 in 16 chance of row change (1% up, 1% move down) Check limits, if on edge or top, reverse old position

Call INVPRINT If bombs dropped, erase old bombs, move down a row, print new bombs

Call KEYBOARD If SPACE pressed and bullet not fired, copy gun position into bullet

Call GUNPRINT If A pressed, move left If A pressed, move right If new position out of range, reverse old co-ordinates

Call MOVBUCKET Erase old gun, print new one If bullet fired, erase old bullet, move up a row, if at top row, reset bullet also print new bullet

For each invader: CHECK If false, Call LASTROW If bullet and invader co-incident, Print bullet, signal dead invader, decrease number

Call SLOWDOWN If false, increase speed, update hitcount, if necessary, print score and lives

Call HITGUN If bomb has hit gun, Call SLOWDOWN If bomb is on bottom line, Call INCDRAWN

Loop back to CHECK for next invader Loop back to MOVPRM until all invaders updated Go back to MAINLOOP to repeat sequence

INCDRAWN Award extra life, keep live time, start another screen by, switching to SLOWDOWN

ENDGAME Call DISPLAY print end message Flash screen and beep, keep very low tone

Start another game by jumping to BEGIN



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Logo and

We welcome back Tim Hartnell who this issue gives us a fascinating article on Logo, a new language for the Spectrum and an introduction to turtle graphics.

Logo is quite different from BASIC. It was designed with the lofty aim of being a language which would 'teach-learning', and, in a certain sense, this aim has been realised.

Powered by Dr Seymour Papert when he was a Professor of Mathematics and Education at the Massachusetts Institute of Technology in the US (he has now moved to France where he is one of the leaders of the World Computer Council), Logo is intended to be the very first programming language a person learns. The first language you learn inevitably colours the way you program and the way you think about programming for the rest of your life. Proponents of Logo claim that the base provided by initial exposure to Logo is a far more suitable one for future programming excellence than is a language such as BASIC.

Is there a base for such a claim? Papert says that many teachers have only seen computers as devices which can extend the traditional ways of doing things in the classroom, rather than as utterly new teaching tools. In contrast to this, Papert says Logo is a liberating device, which enables computers to be used to teach new and important skills, including the skill of 'learning how to learn'.

Following observations made by Jean Piaget that children are able to learn quite complex skills — such as being able to talk and walk — without formal training, and the fact that this highly effective informality was absent in traditional classroom teaching, Papert set out to create a language which would remedy that deficiency. Papert says most school instruction is

computer programming puts the child almost in the position of being programmed by the computer. Logo, by contrast, puts the child firmly in charge.

It does this by allowing the programmer to create new shapes and actions — such as one which draws a triangle — and then get the computer to execute this on demand, simply by entering TRIANGLE. BASIC has no such way of creating new commands and functions.

But just about anyone in France, let alone live there for a while and they will become stated French questions without they had a prior concept of themselves as 'not good with languages'. The same holds true for mathematics, claims Papert. Part of Logo's function is to allow users to 'live in Mathland' where there is no such thing as a person who is 'not good at Maths'. In an article,

'Logo in the Schools' (REVIEWS magazine, August 1982, pp 118-134), Daniel Watt reports that 'teachers found that students who had taken part in the Logo classes were more willing to 'argue sensibly about mathematical issues' and to explain that "mathematical difficulties clearly" '.

When computers were first developed, memory was at a premium. Programmers had to bend their thinking to the demands of the machine (such as integer variable names starting with specific letters), regardless of how much extra work this added. The thinking that human beings should see through to handle themselves before the computer's demands has continued.

Although BASIC is relatively easy for a computer to interpret as well as easy to teach, it is not a flexible language and

learn-from-program constructs are sometimes needed. Papert and his team at MIT studied when developing Logo that they would not allow their work to be limited by computer technology. Rather than spend their thinking to the cheap (for the time) computers available when they began their work in the late sixties, the team worked with the happen mean-frames they could.

The most familiar aspect of Logo is turtle graphics, where the computer controls the movement of a 'turtle' (a triangular shape on the screen) which leaves a trail behind it as it moves. Therefore, if the turtle moves up the screen for an inch, turns through 90 degrees and moves another inch, moves again, it will have traced out a square.



The most turtle used in schools in conjunction with Logo graphics programs.



Photograph courtesy of Jeanne Armstrong-Lee

turtles



Turning turtle?

Turtle moves in "turtle steps" (each a screen frame about 200 turtle steps high). A turtle command is often in the form of a direction (such as FORWARD) followed by the number of turtle steps — FORWARD 100 would cause the turtle to move half way up the screen. FORWARD is the direction the triangular cursor is facing.

With Logo, the computer can be taught a sequence of moves such as the one we decided to trace: four squares and the sequence can be "remembered" by the computer under the name, say, SQUARE. Then, whenever we want the turtle to draw a square, we just enter SQUARE. A sequence of moves like this is called a procedure. The process of drawing a square could be even simpler. Think of FORWARD 100. The computer draws a line up the screen. The word RIGHT followed by a number turns the turtle to the right the number of degrees specified by the following number, so RIGHT 90 will make it turn through a right angle. Moving FORWARD 100 again will draw a line at right angles to the first. Follow this with RIGHT 90 and the turtle will turn through another 90 degrees (and will now be facing down the screen). Going through the sequence FORWARD 100 RIGHT 90 four times will draw a square.

This should give us a hint as to how the procedure SQUARE

would be coded. Here, strictly. The Logo word REPEAT means "do it a number of times". The computer repeats the instruction which follows the number however many times are specified. So, to create a square-drawing program we need the following:

```
TO SQUARE
REPEAT 4 (FORWARD 100
RIGHT 90)
END
```

Note that the first line of this program, TO SQUARE, is the procedure title line. Run it, and the computer then knows what a square is and can produce one whenever it encounters the command SQUARE. As if you saw you can appreciate there is no such facility in BASIC for creating new commands at will.

Logo has other useful commands, as such as CLEAR, SCREEN, and PUP which "lure the pen" from the screen and PENDOWN. You can draw a line, lift the pen up and move it to another part of the screen, put the pen down and continue drawing.

Looking back to our definition of the procedure SQUARE above. You can see that if we had a way of entering the size (the 100 in our example) each time we ran the program, SQUARE could be used to draw squares of any size. Logo allows for this. If you include the variable name in the procedure title line, preceded by a colon, the computer will wait for you to enter the required information:

```
TO SQUARE :LENGTH
REPEAT 4 (FORWARD
:LENGTH RIGHT 90)
END
```

To run this, you enter SQUARE 84 (replacing 84 with the side length you choose).

From this, it is easy to see that we could do much more than just change the length of the side. We could easily define a procedure which allows you to specify not only the length of the side, but the number of repeats and the angle through which the turtle will turn.

If you're creating mental pictures of the effects of such of these changes, you'll see what a powerful tool we now have on our hands.

```
TO SHAPE :MANY :ANGLE
:LENGTH
REPEAT :MANY (FORWARD
:LENGTH RIGHT :ANGLE)
END
```

This simple procedure holds a wealth of substructure of facts.

To draw a triangle, with sides 32 steps long, you'd just enter

```
SHAPE 3 120 32
```

A star with each line 55 steps long could be drawn with

```
SHAPE 5 144 55
```

We will not yet tell about putting in turtle graphics by pointing out that once the computer has been taught a word such as SQUARE, this procedure can be used within the same definitions. That is, if you wanted the computer to print a shape, then move just a little to the side, then draw the shape again, and repeat this a number of times, you could define the following procedure (assuming that the procedure SQUARE had previously been defined).

```
TO AMAZING :MANY
REPEAT :MANY (SQUARE 50
FORWARD 1)
END
```

There are four important features of Logo

1. PROCEDURES. The language works by defining a sequence of steps called procedures which are then called. Procedures can incorporate other procedures. The classic BASIC equivalent (and it is generally NOT helpful to learn Logo by drawing attention to strictly equivalent BASIC statements) would be a series of subroutines which were called by name (such as COSINE-PAUSE) when PAUSE was a variable which had previously been assigned a value of the line number where the subroutines PAUSE began.

2. INTERACTION. Any command, whether it is one which is part of the original language (such as FORWARD or RIGHT) or one defined as a procedure can be triggered just by entering the command, such as the word (SHAPE) or SQUARE.

3. LISTS. The language supports compound structures called lists which are much easier to manipulate than are data structures such as arrays. They can be manipulated very flexibly. Procedures can be handled as lists.

4. TURTLE GEOMETRY. The "symbolic animal", the turtle will follow instructions to draw shapes on the screen. Turtle graphics have proved an excellent way of introducing the concepts and practice of computer programming, and also as the base upon which a computer based mathematical curriculum can be built.

Further reading on Logo

Mindstorms: Children Computers and Powerful Ideas — Simon Papert (Basic Books New York, 1980)

Logo for the Apple II — Harold Johnston (BENTON/Down Hill, Philadelphia 1982)

Learning Logo on the Apple II — Anne McDougall, Tony Adams, Pauline Adams (Penguin-Hall of Australia, 1982)

The August 1983 (Volume 7, Number 8) issue of BYTE magazine is dedicated to Logo and is an extremely useful introduction to both the language, and to its implications.

(This article is reprinted, with permission, from an appendix in the book "Educational Uses of the ZX Spectrum", Harriet Johnson and Valerius, published by Zedler Books, and distributed by John and Wiley and Sons.)

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```

10 REM Program P35
"DIARY"
20 BORDER 1: PAPER 7: INK 1:
CLS
30 PRINT AT 9,12:"DIARY"
40 PAGE 100: CLS
50 PRINT AT 3,3:
"This program allows you to
write a page of your diary
and save the result onto
tape.
The option of displaying a
previously recorded page is
also given."
60 PRINT AT 15,3: FLASH 1:
INK 3:
"PRESS ANY KEY TO CONTINUE"
: PAGE 0: CLS
80 REM 48K24,300
100 PRINT AT 4,4:

```

Keep yourself up to date with this sample program from a new book, 100 Programs for the ZX Spectrum.

Primedia Hall International are publishing a new collection of programs for the Spectrum by authors Ian McLean and John Gordon. The book is a large paperback which, as can be deduced, contains 100 program listings. A tape of these can also be purchased. The book is priced at £8.95 and the cassette at £11.95.

I have sent the book to Patrick Cunniff for a full review (not necessarily, Primedia Hall have allowed us to publish a sample program from the book).

All the programs are given in this format, some have more detail given, some longer explanations but all are set in the same typeface which is easier to read than the Sinclair printer

reproductions often found nowadays.

The programs are split into ten sections with the following headings:

Introduction
Games
Business
In the Home
Graphics
Data Handling
Recreation
In the School Lab
Mathematics
School

Our sample is taken from the In the Home section. They could be used both to store diary information and as a simple word processor. Note in the program and M4M following the instructions.

"Do you wish to.....

1. Review an old page

2. Write a new page

3. End the program"

100 PRINT AT 14,5: INK 1:

"ENTER CORRECT RESPONSE"

110 INPUT "Option 1,2 or 3 ":

opt

140 IF (opt=1) AND (opt=2)

AND (opt=3) THEN CLS :

PRINT AT 17,9:

"ENDING RESPONSE"

Press any key."

150 CLS

160 IF opt=1 THEN STOP

170 IF opt=1 THEN GO SUB 430

180 IF opt=2 THEN GO SUB 300

200 STOP : REM End of program

220 PRINT AT 4,5: FLASH 1:

"PRESS ANY KEY: PAGE 0:

CLS

230 INPUT

"What is today's date? ",14

240 CLS

250 PRINT AT 5,4:

"Type your diary page for

"14

```

200 PRINT AT 18,5: FLASH 1:
    "PRESS ANY KEY TO START"
210 PAUSE 0: CLS
220 FOR I=1 TO 21
230 FOR J=1 TO 30
240 IF J<1 THEN LET J=1:
    GOTO 1,2
300 IF INKEY$<>"*" THEN GO TO 510
310 IF INKEY$<>"*" THEN GO TO 510
320 IF CODE INKEY$=13 THEN LET
    J=30: GO TO 330
330 IF CODE INKEY$=12 THEN
    PRINT CHR$ 8;" *CHRG 8:
    LET J=J-1: GO TO 330
340 LET A$(I,J)=INKEY$:
    PRINT A$(I,J):
500 IF J=30 THEN GOTO 1,2
510 NEXT J
520 PAUSE 1
530 FOR I=1 TO 5: GOTO 1,2:
    NEXT I
540 INPUT
    "Has your recorder been set
    up correctly with a tape in

```

```

10 T(r/n) *;reap
20 IF respOy OR respOY
    THEN GO TO 500
300 SAVE A$ DATA A$(I)
310 PRINT AT 9,3:
    "REWIND TAPE FOR VERIFYING"
400 VERIFY A$ DATA A$(I)
410 RETURN
420 CLS
430 INPUT
    "What is the date of the
    page that you wish to
    review?
    (Enter date as before)
    ";p$
440 PRINT AT 8,3:
    "LOAD RECORDER WITH CORRECT
    TAPE AND REWIND TO
    CORRECT POSITION"
450 PRINT AT 16,4: FLASH 1:
    "PRESS ANY KEY WHEN READY"
460 PAUSE 0
470 LOAD p$ DATA A$(I)
480 CLS
490 PRINT A$
500 RETURN

```

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Spectrum lessons

Mike Edmunds takes his Spectrum into school and reports on some of the latest educational software available.

With an increasing amount of educational software now on the market, we felt that we ought to have a special reviewer for these programs. Mike Edmunds has enough computing experience to be able to assess the standard of programming and as a professional teacher, can give a qualified opinion on the educational value of the software. Of course, he can also test out the programs in the pupils at his school — the lucky lot!

Early Punctuation, The Apostrophe, Capital Letters and Speech Marks — Sinclair Research

Spelling and punctuation have never been the interest of subjects for children, so any material that makes the task

easier should be welcomed. A new range of software by Blackboard Software under the Sinclair banner aims to bring 'a little learning clarity' to those tricky subjects.

Designed for use both at home and in the classroom these cost £7.95 each but cheap if you intend to use the whole series, but all have something of value to offer. Each is a fairly well structured package with a definite purpose which offers the user a learning experience and experience that would be difficult to achieve without a computer.

These programs are not intended as teaching packages in themselves, rather as an complement to a lesson. As such, each comes with a pamphlet briefly outlining the aims and giving full instructions as to how to 'use' the program for children of differing abilities. A lot of useful hints

for further practice is also included.

Although the theme of each program is different, the format is very similar. Instructions are followed by a 'test by any' example section and brief examples are given before the exercises proper. Successful completion of these gives entry to the final level or the reward game. These rewards are fairly basic in nature, being merely keyboard trainers, but do seem to be instructive as well as entertaining and manage to be useful in both a colourful and amusing way. Graphics and sound are used to good effect in all of the programs.

In Early Punctuation the child has to decide what punctuation is required and an animated figure drops in the appropriate mark when the correct key is pressed. Good feedback combinations is rewarded here as the figure is in

constant motion throughout the master keys would have been better. Each correct answer brings a hint and builds up a further element of a picture used as part of the final 'shoot em-down' reward game.

Capital Letters again uses the matchstick figure (this time controlled by cursor keys) to correct sentences with missing capitals. As with all the programs in this series, incorrect responses bring an invitation to try again — the computer avoids by providing the answer after repeated errors.

In The Apostrophe a bird is guided to drop a worm (the apostrophe) into the correct place. The worm gets to drop back in the keyboard when reward game when it can match the flowers if your responses are too slow. This game is rather spoilt by 'fluffy' target letters.

Speech Marks is of a rather



more complex nature and therefore offers three levels of difficulty. Sometimes you can take one or two sets of speech marks, direct or reported speech at a mission at each. This was the only program with a bug, a missing set of speech marks which remained unsupported by the computer.

On the whole though, Sinclair Research have produced a nice package of programs to entice the rather dull and mathematical process of punctuation, a pity some of the games lack imagination.

All programs are priced at £7.95 and available from Sinclair Research Ltd, 39a Highgate Road, Caversham, Surrey GU11 3JF.

Learn to Read (Programs 1-5) — Sinclair Research

A series of programs entitled Learn to Read is one of the latest educational offerings from Sinclair in collaboration with Macmillan Education. Together they have produced a comprehensive package for use by both parents and teachers to take children through the early stages of reading. The programs are based upon the popular *Guinea Pig* reading scheme, but can be used independently or alongside any reading scheme, using such techniques as word recognition, phonic (the way words are written with sounds) nature matching, match and spell and so on.

All the tapes are attractively packaged in a sturdy box and come complete with a helpful booklet which outlines the way in which the parent can help, as well as detailing the role that the computer can play in their child's reading development.

The programs have been designed to make full use of the Spectrum graphics and sound capabilities and in this respect succeed admirably. Loading is reliable and the initial screen displays give a taste of the fun to come in Learn to Read 1: we are introduced to colourful representations of Sam the fox, the fat pig and their friends and these characters play leading roles throughout the series. Familiar

names accompany each stage of the programs and serve to enhance the excellent graphics.

Although the programs can be used by the child alone, it is encouraged and indeed is necessary for the early tasks. On advice instructions have been kept to a minimum, but initial reading should be an adult's essential for the youngest child.

All five programs in the series provide a substantial amount of activity and will keep any child entertained for a long time. Each session is very user-friendly and above all, fun to use, helping the child to realise that learning can actually be enjoyable.

Learn to Read 1, 2 and 3 use the same format, consisting of 'frames' — an introduction to the characters and new vocabulary, 'Kim' — exercises on layout, thinking and memory, 'Sam' — phonic and spelling practice and 'Cand' — a picture-based game for the matching of pictures, phrases or spellings. Learn to Read 4 deals primarily with alphabetical sequencing under the titles 'near' and 'middle'. 'Find', the final title, is a card-solitaire program. The last program in the series deals with positional names made on the letters of and so on using 'map' and spelling games.

A lot of thought has gone into these programs. They are well structured and help the child move in easy stages towards becoming a reader. The programs aim to be diagnostic in approach, in that they gently prompt when an error is made, then reinforce by giving the mistake and follow it with an exercise to try again. Emphasis is placed on correct spelling at all stages but the necessary capitals and punctuation are built into the programs. Sinclair and Macmillan wish to be tried a winner here as this is an excellent series of 'teaching' programs. They are rather expensive too, in this case, the price is justified by the quality. However, as with all things, the proof of the pudding.

Learn to Read programs are £7.95 each and available from Sinclair Research Ltd.



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Battlef

Fancy your chances as a tank commander? James Thuriby of Farnborough lets you try.

"Message from HQ to Tank Commander. Destroy enemy units. Return to base. Warning. Fields contain mines, traps and orders. You have 10 tanks. Good Luck."

If you manage to complete your mission then you get your just reward — another mission with even more obstacles to avoid, and a greater concentration of enemy units.

To wipe out an enemy unit all you have to do is to drive your tank over it, simple but effective. Once all the obstacles have been destroyed then you will be told to return to your base camp. At the end of the game you will be given a ranking according to your performance.

This is one of those simple but annoyingly addictive games which appear now and then. Controlling your tank is not as easy as it looks and accurate timing of key presses is essential.

Your computer controlled tank responds to key "q" to go up, "r" down, "l" left and "k" right. However, it only recognises lower case letters so make sure that CAPS LOCK is off or as an expedient adjust the program to take this into account.

Variables

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Character array holding screen display

Number of tanks left

Number of enemy units destroyed

Stage of the game

Random numbers used to calculate

position of obstacles

Tank LOG difference for each of the four

directions

Horizontal and vertical position of tank

Old tank position

Number of enemy destroyed in this stage

Tank direction of movement

Change of direction on key pressed

Loop variable

Points achieved by player

Duration and spin values for BEEPs

Most string for questions asked in the

program



field

Down the lines

100-127
130-300
1000-1990
2000-4990
5000-5140
4000-4090
7000-7930
7940-8030

8000-8190

Initialisation routines

Main program loop

Move tank routine

Checks

Tank destroyed and end routine

Stage-completed routine

Screen coordinates

Initialisation of all

variables etc

Instructions

and LOG

set up

```

100 REM main program
110 GO SUB 7000
120 GO SUB 7940
130 PRINT AT a,b:PAUSE 10
127 LET w=0
130 LET w=INKEY
135 IF w=0 THEN GO SUB 10
GO
140 IF w="" THEN LET w=a:PRINT AT a,b:INKEY 7940:PAUSE 5:
GO SUB 1000
150 GO SUB 3000
200 GO TO 130
1000 REM move tank
1005 BEEP .01,5: BEEP .01,5
1008 IF w=0 THEN "q" AND w=0 THEN "a"
AND w=0 THEN "r" AND w=0 THEN "z" THEN
LET w=w
1010 LET a=a+1:w="a" AND a<255-1
w="q" AND a=1
1020 LET b=b+1:w="b" AND b<311-1
w="r" AND b=1
1040 LET l=w+"a" AND w="q":l="b"
AND w="r":l="c" AND w="b":l="c"
AND w="z":l="d"
1050 PRINT AT a,b:INKEY 7940
1055 PRINT AT a1,b1:INKEY 4:
1060 LET a=a1:LET b=b1
1070 LET w=w
1075 RETURN
2000 REM check safety of move
2010 IF w=a,b="" THEN GO TO
2020
2020 IF w=a,b="b" THEN FOR a=
1 TO 5: BEEP .1,-20: BEEP .05,-5
0: NEXT +: PRINT AT 0,0: FLASH

```



```

11 BRIGHT 11 INK 01" YOU RAN 1
AND A TANK-DEAF" "1 GO SUB 30
3000 GO TO 3990
3000 IF a1a,b1="L" OR a1a,b1="
H" OR a1a,b1="I" OR a1a,b1="J"
OR a1a,b1="K" THEN FOR f=1 TO
10: BEEP .01,-15: BEEP .05,-17:
BEEP .01,-19: NEXT f: PRINT AT
0,0: FLASH 11 BRIGHT 11 INK 01"
YOU DROVE INTO A CRATER"
"1 GO SUB 3000: GO TO 3990
3040 IF a1a,b1="E" THEN FOR f=
1 TO 3: BEEP .1,-20: BEEP .1,-19:
BEEP .1,-18: NEXT f: PRINT AT
0,0: FLASH 11 BRIGHT 11 INK 01"
YOU HIT A LAND MINE"
"1 GO SUB 3000: GO TO 3990
3045 IF a1a,b1="M" AND aa >= a
1a9992 AND aa < 99 THEN GO TO
3400
3047 IF a1a,b1="N" THEN GO TO
3990
3050 IF a1a,b1="F" THEN PRINT
AT 0,0: BRIGHT 11 INK 01" HE
SSION SUCCESSFUL "
3060 RESTORE 3070: FOR f=1 TO 6:
READ c,d: BEEP c,d: NEXT f
3070 DATA .2,19,.1,19,.3,19,.3,1
5,.3,17,.3,14,.3,13,.5,13
3080 LET dest=dest+1: LET a1a,b
1=" "
3090 PRINT AT 0,0: PAPER 41"
"
3090 GO SUB 3000: LET aa=aa+11:
IF aa=1a9992 THEN GO TO 3990
3100 REM all destroyed
3110 PRINT AT 0,0: FLASH 11 INK
01 PAPER 21"ALL destroyed - Ret
urn to base. "
3990 RETURN
3999 REM tank destroyed
3000 FOR f=1 TO 400: NEXT f: PRI
NT AT 0,0: PAPER 41" TANK B
ESTROYED
3010 LET a1a,b1=" "
3020 PRINT AT a,b1" "2 LET a=10
: LET b=10: LET a=a+1: LET b=b+1:
PRINT AT a,b1"C's LET b=b+1"
3030 LET aa="B": LET tank=tank+1
3040 FOR f=1 TO 300: NEXT f: PRI
NT AT 0,0: PAPER 41"
"
3050 GO SUB 3000
3060 IF tank=0 THEN GO TO 3140
3070 REM end of game
3080 CLS : PRINT AT 3,31"End of
game." AT 3,32"You needed "d
est1" m111's" AND dest11 OR des
t=011="a" AND dest111="a."

```

```

3090 LET aa="NOVICE" AND dest11
01="CADET" AND dest1 >= 10 AND d
est1201="JUNIOR" AND dest1 >= 20
AND dest1301="SENIOR" AND dest1
>= 30 AND dest1401="CAPTAIN" A
ND dest1 >= 50 AND dest1501="COM
MANDER" AND dest1 >= 70
3100 PRINT AT 10,01"You have re
ached "pr1" status in this
exercise."
3105 RESTORE 4035: FOR f=1 TO 44
: READ c,d: BEEP c,d: NEXT f
3110 INPUT "Another game ? (y/n)
"1 LINE 00
3120 IF aa="y" THEN RUN 120
3130 GO TO 9999
3140 RETURN
4000 REM stage completed okay
4010 CLS
4020 PRINT AT 5,21"Stage "st1a
g" completed....."
4030 RESTORE 4035: FOR f=1 TO 44
: READ c,d: BEEP c,d: NEXT f
4035 DATA .13,14,.1,17,.13,17,.4
,21,0,0,0,0,0,0,0,.1,14,.3,17,
.25,17,.4,21

```



```

1037 DATA 0,0,0,0,0,0,1,14,1,2,1
1  7, 25,17,1,4,21,1,23,17,1,14,1,3,1
1  7,1,3,14,0,0,0,0,0,0,0,1,7,1,7,1,7,
1  3,14,1,3,14,1,3,17,1,2,21,1,2,21,1,4
1  ,14
4038 DATA 0,0,0,0,0,0,1,17,1,4,1
1  7,1,3,21,1,3,17,1,23,14,1,3,14,1,7,1,4
4039 GO SUB 5000
4040 LET aa="B"
4041 RETURN
7700 REM calculate screen co-ords
7710 LET x=INT : RND 4000+1
7720 LET y=INT : RND 4000+1
7730 RETURN
7740 REM initialise
7750 LET tank=5
7760 LET dest=0
7770 LET stage=0
8000 LET stagestage=1
8010 DIM a$12,31
8020 BORDER 1: PAPER 4: CLS
8030 FOR i=1 TO stage+5
8040 GO SUB 7700: LET a$(i,y)="E"
1  ": PRINT AT x,y:INK 1;"E"
8050 GO SUB 7700: LET a$(i,y)="O"
1  ": PRINT AT x,y:INK 2;"O"
8060 GO SUB 7700: LET a$(i,y)="L"
1  ": PRINT AT x,y:INK 3;"L"
8070 GO SUB 7700: LET a$(i,y)
1  =y+1;"H": LET a$(i+1,y TO y+1)=
1  "K": PRINT AT x,y:INK 0;"H":
1  AT x+1,y:INK 0;"K"
8100 NEXT i
8110 FOR i=1 TO stage+2: GO SUB
1  7700
812 IF a$(i,y)="F" THEN GO SUB
1  7700: GO TO 8112
813 IF i+12 AND x>0 AND y+4 THE
1  N GO SUB 7700: GO TO 8112
817 LET a$(i,y)="F": PRINT AT

```

```

1  x,y:INK 0;"F": NEXT i
8120 LET tank=0
8130 LET a=10: LET b=0: LET a$=a
1  : LET b=b
8140 LET aa=0
8150 PRINT AT 10,0;"H"
8200 PRINT AT 0,20;" "
1  : FOR i=1 TO tank-1: PRINT AT 0
1  ,20+i-1:INK 0;"A": NEXT i
8210 FOR i=9 TO 11: PRINT AT i,
1  11 " ": LET a$(i,1 TO 31)=" "
1  : NEXT i
8300 LET a$(10,11)="H"
8310 RETURN
9000 REM instructions
9010 PAPER 0: INK 7: BORDER 0: C
1  LS 1: PRINT AT 0,7;"BATTLEFIELD."
1  : OVER 1: AT 0,7;" "
1  : OVER 0
9020 PRINT AT 2,21;"The game of
1  Battlefield makes you a tank com
1  mander whose job is to cross t
1  he landscape and destroy enemy
1  installations."
9030 PRINT " Ink 5: The follo
1  wing keys control" the tank
1  :
9040 PRINT " " "q" = move up
1  " "d" = move down"
1  " "r" = move right" " "l"
1  = move left"
9100 REM set up the characters
9110 RESTORE 9120: FOR a=1 TO 13
1  : READ a$: FOR b=0 TO 7: READ a:
1  : POKE 104+a$,a: NEXT i: NEXT
1  b
9120 DATA "A",14,144,144,234,234
1  ,254,144,130,"B",130,144,234,234
1  ,254,130,144,14,"C",234,36,124,1
1  77,174,"a",234,0,"b",127,25,62,25
1  4,77,77,127,0
9130 DATA "E",0,0,0,14,124,234,2
1  34,0,"F",112,74,64,74,112,64,64,
1  64,"G",0,14,64,124,124,234,234,2
1  34
9140 DATA "H",0,4,15,31,63,31,31
1  ,15,"I",44,124,234,234,234,234,2
1  34,232,"J",63,63,63,31,31,7,3,0,
1  "K",255,255,234,234,234,234,174,
1  32,"L",14,124,232,232,232,124,25
1  ,14,"M",14,62,134,14,2,2,2,2
9150 PRINT INK 0: REMARKS OF
1  landscape "E" tank-tra
1  ck "B" and color
1  a "L" " "H" " " "A" " " "B"
1  " " "Ready to start ? "
1  : LINE 34
9170 INK 0
9180 RETURN

```


Guitar tutor

All you ever needed to know from Alan Renwick of Norfolk.

In *25 Computing Augment*, we published a 2000 program to help guitarists. We wondered about the possibilities of the Spectrum in this field, and were promptly contacted by Alan who had been working along these lines already. Written for the 48K Spectrum, this is a must for any guitarist, containing routines for expert and beginner alike, and is also a valuable educational aid.

The program is designed to go one step beyond guitar tutor books by making use of the sound capabilities of the Spectrum to aid tuning and to check that you are playing chords correctly. There are limits to the ability of the Spectrum of course, one of which being the fact that only one note at a time can be played, but Alan uses what is available to the full.

The program is structured in a single screen which makes for easy operation or consultation of the routines. Each particular subject is con-

sid at a block of lines which is a multiple of 1000. This is selected from line 500.

If you remembered lines 8000 8000 to 10000 1000 you would have room for three routines of your own at 8, 9 and 10000. The possibilities are endless — how about lyrics along chords and rhythm patterns?

The whole program is built around DATA statements and it is important that these are typed in accurately — especially from 8210 to 8430. If the correct number of spaces are not left the program will crash. Note that the first character is the 1000 character A, but in the listing I replaced by "D" because my printer would print it as "A" and A6 is clearer than A4.

Twenty chords are loaded, but more can be added if you wish by increasing the 20 in line 8210 D66 and adding the extra chords to the DATA statements. These are constructed as follows:

Chd, 1 to 12) Notes which appear under the chord
 13 to 16) Fret position for finger 1
 17 to 22) Fret position for other four fingers
 23 to 26) Chord name
 40 to 60) Values of notes for 8888 if user wants to hear chord

The program uses approx 17.5K but 18K users could load the program too.



```

1 REM # GUITAR TUTOR #
2 ALAN RENWICK #
3 # AUGUST 1983 #
4 REM # The "Fret" notation #
5 REM # is in the listing #
6 REM # should be replaced #
7 REM # with GRAPHICS #
8 REM #####
9
10 PAPER A: INK 3: BORDER 0: C
11 : PRINT AT 10,1) FLASH 1)STO
12 P THE TAPES— THEN PRESS A KEY"
13
14 PAUSE 0: CLS
  
```

```

15 BORDER 0: PAPER 0: INK 3: C
16
17 40 50 CLS 1980
18 45 PRINT INK 7)AT 11,11)BUTT
19 AN TUTOR"AT 17,10) WROG DRAC
20
21
22 50 PAUSE 3000 PRINT INK 4) FL
23 AN 1)AT 0,1)"PRESS ANY KEY TO S
24 TART"
25
26 60 PAUSE 0: CLS
27 200 60 SUB 1000
28 210 GOTO 23476,9
  
```

```

500 REM * MENU *
510 INK 7: PAPER 1: BORDER 1: I
INVERSE 1: CLS
520 PRINT AT 1,81:"GUITAR TUTOR."

```

```

530 PRINT OVER 11AT 1,81:_____

```

```

540 PRINT "CHAPTER 1-INTRODUCT
TION TO TUTOR"

```

```

550 PRINT "CHAPTER 2-TUNING T
HE GUITAR"

```

```

560 PRINT "CHAPTER 3-FINGERED
AND DIAGRAM"

```

```

570 PRINT "CHAPTER 4-TRANSPOS
ING SONGS"

```

```

580 PRINT "CHAPTER 5-TWENTY B
ASIC CHORDS"

```

```

590 INPUT INK 8:"PLEASE TYPE I
N THE NUMBER OF THE CHAPTER YOU W
ANT TO USE:" SUBS PROGRAM: (X)X
NEXT OF (X)1000" AND (X)5000" AND
(X)1000" AND (X)5000" AND (X)1000"
AND (X)5000" THEN GO TO 500
595 INVERSE 0

```

```

595 IF (X)5000" THEN CLS : GO TO
5: PEEK STOP
595 IF VAL (X)1 OR VAL (X)5 THE
N GO TO 500

```

```

595 GO SUB VAL (X)1000
400 GO TO 510
1000 REM * INTRODUCTION *
1010 PAPER 4: BORDER 4: INK 10:
CLS

```

```

1100 PRINT INVERSE 11AT 0,81:"CH
APTER ONE."

```

```

1110 INVERSE 0: PRINT AT 3,41:"OU
STAR TUTOR IS DESIGNED TO PROVIDE
E BASIC INFORMATION FOR GUITAR
PLAYERS."

```

```

1120 PRINT "IT WILL HELP YOU W
ITH TUNING THE GUITAR, LEARNING CH
ORDS, AND EVEN TRANSPOSING SONGS F
ROM ONE KEY TO ANOTHER."

```

```

1130 PRINT "YOU CAN USE GUITAR
TUTOR LIKE A BOOK, DECIDING ON WH
ICH CHAPTER YOU WANT TO USE, SO
THERE'S NO NEED TO GO THROUGH
THE WHOLE PROGRAM IF YOU ONLY
WANT ONE BIT OF IT. EACH CHAPTER
IS SELF-EXPLANATORY."

```

```

1140 PRINT INVERSE 1: INK 21:
TO RETURN TO MENU AT ANY TIME
JUST PRESS N.

```

```

1150 PRINT INVERSE 0: FLASH 11:
PRESS H TO CONTINUE

```

```


```

```

1160 FLASH ON IF INKEY="N" THEN
N GO TO 1140

```

```

1170 IF INKEY="H" THEN RETURN

```

```

1000 REM * TUNING THE GUITAR *
1010 BORDER 7: PAPER 7: INK 0:
CLS

```

```

1100 PRINT AT 0,81 INVERSE 11:"CH
APTER TWO."

```

```

1210 INVERSE 0: PRINT "THERE AR
E MANY TYPES OF TUNING WHICH CA
N BE USED ON THE GUITAR, BUT THE
MOST COMMON IS THE ONE SHOWN ON
THE NEXT PAGE."

```

```

1220 PRINT "ABOVE EACH STRING I
S THE NAME OF THE NOTE THAT THE S
TRING SOUNDS WHEN OPEN. THE DIAG
RAM SHOWS HOW THE GUITAR CAN BE T
UNED IN A RELATIVE WAY."

```

```

1230 PRINT "THE NEXT PAGE SHOWS
HOW TO TUNE THE GUITAR WITH THE
HELP OF ANY KEYBOARD."

```

```

1240 PRINT "THE LAST PAGE GIVES
A METHOD OF TUNING USING THE SP
ECTRUM'S OWN LOUSPEAKER"

```

```

1250 PRINT FLASH 11:"PRESS A KEY
TO CONTINUE IN MENU"

```

```

1255 IF INKEY="H" THEN GO TO 21
55

```

```

1260 IF INKEY="N" THEN RETURN

```

```

2000 REM * PAGE 2 *

```

```

2005 BORDER 1: INK 7: PAPER 1:
CLS

```

```

2210 GO SUB 5000

```

```

2215 PRINT AT 0,71:"RELATIVE TUNI
NG" OVER 11AT 0,71:_____

```

```

2220 PRINT INVERSE 11AT 14,71:"A
1AT 14,11:"E"1AT 14,13:"G"1AT 1
5,15:"B"1AT 14,17:"D"

```

```

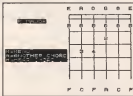
2225 PLOT 75,40: DRAW 14,83: PLO
T 91,40: DRAW 14,83: PLOT 107,40
: DRAW 14,83: PLOT 123,78: DRAW
14,40: PLOT 139,40: DRAW 14,83

```

```

2230 INK 7: PRINT AT 15,01:"TO TU
NE THE GUITAR IN RELATION TO IT
SELF USE THE DIAGRAM ABOVE."

```



```

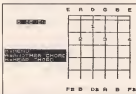
0 TUNE THE "I" INVERSE I:"A" INV
8888 00" STRING TO THE BOTTOM "I
INVERSE I:"B" INVERSE 01" PRE
9 THE "I" INVERSE I:"B" INVERSE
01" AT THE 8TH PRINT DIVING "I IN
VERSE I:"A" REPEAT FOR OTHER
STRINGS UNTIL ALL ARE IN TUNE."
2235 PRINT INVERSE I: INK 01" I
=INFO R=MENU OTHER=CONTINUE "
2240 IF INKEY=" " THEN GO TO 22
40
2245 IF INKEY="N" THEN RETURN
2250 IF INKEY="I" THEN GO TO 2
500
2375 REM # PAGE 3 #
2380 PAPER 7: BORDER 7: INK 0: C
LE
2385 PRINT INK 11" TUNING U
SING A KEYBOARD: PRINT OVER I:
AT 0,31"
2390 PRINT INK 21 INVERSE I:AT
4,01"CHORD C"
2395 PRINT INVERSE I:AT 10,201"
ANY KEY TO:AT 11,201" CONTINUE
I:AT 12,201" R = MENU I:AT 13,20
1" I = INFO "
2400 GO SUB #500
2410 FOR Y=2 TO 257 STEP 14
2420 PLOT Y,0: DRAW 0,30
2430 NEXT Y
2440 LET U=1: GO SUB #500
2450 FOR U=33 TO 30 STEP 14: GO
SUB #500
2460 NEXT U
2470 FOR U=97 TO 129 STEP 14: GO
SUB #500
2480 NEXT U
2490 FOR U=145 TO 182 STEP 14: G
O SUB #500
2500 NEXT U
2510 FOR U=209 TO 235 STEP 14: G
O SUB #500
2520 NEXT U

```

```

2535 PLOT 0,0: DRAW 250,24 PLOT
0,250: DRAW 250,0
2540 PRINT INVERSE I:AT 21,101"
I:AT 21,71" I:AT 21,131" I:AT 21
,191" I:AT 21,231" I: INK 2:AT 2
1,250" I: INK 0:AT 21,251"
2545 INK 2
2550 PLOT 10,341: DRAW 45,35
2555 PLOT 55,341: DRAW 35,33
2560 PLOT 105,341: DRAW 0,30
2565 PLOT 150,341: DRAW -30,33
2570 PLOT 185,341: DRAW -45,33
2580 PLOT 220,341: DRAW -55,33
2585 INK 0
2590 IF INKEY=" " THEN GO TO 25
90
2595 IF INKEY="N" THEN RETURN
2597 IF INKEY="I" THEN GO TO 2
600
2598 REM # PAGE 4 #
2600 PAPER 7: BORDER 7: INK 0: C
LE
2610 PRINT I:AT 01" TUNING USING
THE SPECTRUM: PRINT OVER I:AT
0,31"
2620 PRINT AT 3,01" USING THE SPE
CTRUM'S INTERNAL SPEAKER IT IS
POSSIBLE TO TUNE A GUITAR. ALT
HOUGH NOT ENTIRELY ACCURATE A VE
RY GOOD RESULT IS POSSIBLE."
2630 PRINT AT 9,01" USING STANDARD
D PRACTICE THE STRINGS ARE N
UMBERED FROM 1 TO 6 AND SOUND BEL0
W. SIMPLY PRESS THE REQUIRED NOTE
ON ON THE KEYBOARD AND THE CORRE
CT NOTE WILL SOUND. BY REPEATING
THIS PROCEDURE YOU CAN TUNE THE
GUITAR."
2640 PRINT INVERSE I: INK 4: I:
N 0:AT 10,01" PRESSING 7 PLAYS A
LL STRINGS. "
2650 PRINT INK 21:AT 10,01" 1
2 3 4 5 6 7 1 "I:AT 1
20,01" 1 2 3 4 5 6 7
E "
2654 PRINT " R =MENU I=INF
ORMATION "
2655 INPUT 04 "
2657 IF 04="1" THEN GO TO 2655
2658 IF 04="0" THEN RETURN
2660 IF 04="1" AND 04="2" AND
04="3" AND 04="4" AND 04="5"
AND 04="6" AND 04="7" THEN 10
IF 13,201: GO TO 2665
2665 IF 04="1" THEN GOTO 1,4
2670 IF 04="2" THEN GOTO 1,-1
2675 IF 04="3" THEN GOTO 1,-5
2680 IF 04="4" THEN GOTO 1,-10
2685 IF 04="5" THEN GOTO 1,-15

```



```

2490 IF DB="A" THEN REPT 1,-20
2495 IF DB="T" THEN REPT 1,-200
PAUSE 50: REPT 1,-10: PAUSE 50:
REPT 1,-10: PAUSE 50: REPT 1,-5
: PAUSE 50: REPT 1,-5: PAUSE 50:
REPT 1,-4
2760 GO TO 2485
2899 PAUSE 0
3000 REM # FINGERBOARD #
3100 BORDER 0: PAPER 0: INK 7: C
LS
3110 PRINT AT 0,7:"FINGERBOARD L
AYOUT": PRINT OVER 3:AT 0,7:"_

```

```

3120 PRINT AT 3,0:"THE FOLLOW
ING PAGE THERE IS ABOARD WHICH
SHOWS THE NOTES THAT ARE PROD
UCED BY FRETTERD STRINGS AT TH
E FIRST 12 frets. AFTER 12 fret
S THE PATTERN REPEATS ITSELF."
3130 PRINT "" INVERSE 1:"PLEASE
NOTE:1 INVERSE 0:" THE FOLLOWING
NOTES HAVE TWO NAMES:"
3140 PRINT "" A/B/C D/E/F G/H/I
J/K/L M/N/O P/Q/R S/T/U
V/W/X Y/Z/ab "
3150 PRINT "" FLASH 1:" M - MENU
ANY OTHER = CONTINUE "
3160 IF INKEY$="" THEN GO TO 31
55
3165 IF INKEY$="M" THEN RETURN
3168 CLS
317 REM # PAGE 2 #
3170 PRINT AT 0,7:"FINGERBOARD L
AYOUT": PRINT OVER 3:AT 0,7:"_

```

```

3175 PRINT AT 3,1:"E A B C
D
3176 RESTORE 3000
3180 FOR N=1 TO 12
3190 READ DB
3200 DATA "F" Fb Eb Ea C F
", "Fb E A Cb Fb", "F
C F Fb B G", "Fb Cb F
B Eb G", "A D G C E
A", "Eb Ed Gb Cb F Bb", "B
E A D Fb Eb", "C F Bb
Eb G C", "Cb Fb B E G
Cb", "D G C F A Eb", "E
B Gb Cb Fb Bb Eb", "E A
B D B E"

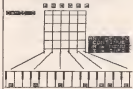
```

```

3210 PRINT AT N+3,1:DB
3220 REPT H
3230 FOR H=7 TO 14: PRINT OVER
3:AT N,7:"_":
REPT H
3234 PRINT PAPER 3:AT 3,9:"_
"
3235 FOR N=1 TO 12: PRINT INK 4
:AT N+3,0:"FRET #":

```

TUNING USING A KEYBOARD



```

3235 NEXT H
3240 FOR H=72 TO 244 STEP 32
3245 PLOT N,40
3250 BRAB 0,112
3255 NEXT H
3260 PRINT "" A/B/C D/E/F G/H/I
J/K/L M/N/O P/Q/R
S/T/U V/W/X Y/Z/ab "
3270 PRINT "EMERGE 1:"PRESS "M
" TO RETURN TO THE MENU "
3280 IF INKEY$="" THEN GO TO
3300
3310 RETURN
4000 REM # TRANSPOSING #
4000 RESTORE 3310
4000 BORDER 4: PAPER 4: INK 2: C
LS
4010 PRINT AT 0,8:"TRANSPOSING S
HOWS:" PRINT OVER 3:AT 0,8:"_
"

```

4020 PRINT AT 3,0:"IT IS OFTEN T
HE CASE THAT THE KEY THAT A SO
NG IS WRITTEN IN IS UNSUITABLE FO
R YOU. IT COULD BE TOO HIGH, OR T
OO LOW, OR PERHAPS THE CHOICE AR
E NOT ONES THAT YOU KNOW. THE TAB
LE ON THE FOLLOWINGPAGE SHOWS H
OW TO CHANGE THE KEY OF A SONG
SIMPLY. THIS IS THE PROCESS CALLE
D TRANSPOSING."

4030 PRINT "" TO USE THE TABLE L
OOK DOWN THE LEFT COLUMN FOR TH
E ORIGINAL KEY AND THE KEY YOU WA
NT TO CHANGE IT TOO. BY LOOKING
ACROSS YOU WILL SEE WHICH CHO
SE IN THE NEW KEY CORRESPONDS TO
THE ORIGINAL."

```

4040 PRINT ALL INVERSE 1:" M=M
ENU ANY OTHER=CONTINUE "
4100 IF INKEY$="" THEN GO TO 41
00
4110 IF INKEY$="M" THEN RETURN
4120 CLS

```

FINGERBOARD LAYOUT



```

4130 REM # PAGE 2 #
4140 PRINT INVERSE 1:AT 0,0:TR
ANSPOSITION CHART:1:AT 1,0:HEX"
4200 FOR N=1 TO 3: READ T#
4250 PRINT AT N#2+0,0:TB
4275 PRINT OVER 1:AT N#2+0,0:TB
NEXT N
4280 REM T#
4285 FOR N=0# TO 255 STEP 3#
4295 PLOT N,0: DRAW 0,14#
4295 NEXT N
4320 PRINT AT 2,0:

```

```

4290 DATA "C D E F G A
B C","D E F G A B C#","
E# F# G A B C# D#","F#
G A B C D E F#","G A
B C D E F# G#","A B C# D#
E# F# G A B C#","F# G A B C#
E F# G A","B C# D# E F# G
A B#"

```

```

4290 FOR N=0 TO 255: PRINT PAPER
T# OVER 1:AT N,0:TB
4300 PRINT 0: INVERSE 1: PAPER
# FOR MENU I FOR INFO"
4305 IF INKEY#="M" AND INKEY#>
"1" THEN GO TO 4305
4310 IF INKEY#="D" THEN GO TO 4
000
4320 IF INKEY#="R" THEN RETURN
5000 REM # CHORDS #
5001 PAPER 1: BORDER 1: INK 2: C
LS
5150 PRINT INK 4:AT 0,4:20 USE
FL CHORDS:PRINT OVER 1: INK
4:AT 0,4:
5160 PRINT "THE NEXT PAGE CONTA
INS A LIST OF TWENTY OF THE MOST
COMMONLY USED CHORDS, BY TYPING IN
THE NUMBER OF THE CHORD YOU CA
N SEE HOW IT IS PLAYED, EACH STEP

```

LAY ALSO HAS THE OPTION OF LISTE
RING TO THE CHORD."

5170 PRINT "USING THIS COLLEC
TION OF CHORDS IT IS POSSIBLE TO
PLAY MOST POP SONGS."

5180 PRINT INK 4: INVERSE 1:AT
20,0: # FOR MENU OTHER TO COM
TINUE."

```

5190 PAPER 0
5200 IF INKEY#="R" THEN RETURN
5230 CLS
5300 REM # PAGE 2 #
5430 CLS

```

```

544# FOR N=1 TO 30: PRINT AT N,0
N: PRINT AT N,12:INK 1:23 TO 3#
1: NEXT N

```

```

5450 INPUT "ENTER NUMBER OF CHOR
D # "I#

```

```

5455 IF I#1 OR I#20 THEN GO TO
5450

```

```

545# CLS

```

```

5457 REM # PAGE 3 #

```

```

5460 LET P#-0:121

```

```

5500 FOR N=12# TO 24# STEP 2#

```

```

5510 PLOT N,14#

```

```

5520 DRAW 0,-120

```

```

5530 NEXT N

```

```

5540 FOR N=13# TO 24# STEP -2#

```

```

5550 PLOT 12#,N

```

```

5560 DRAW 120,0

```

```

5570 PLOT 12#,14#

```

```

5580 DRAW 120,0

```

```

5590 NEXT N

```

```

5600 PRINT AT 2,0:1:AT 2,10:1
AT 2,21:0:1:AT 2,24:0:1:AT 2,
27:0:1:AT 2,30:1:0

```

```

5700 PRINT AT 21,15:1:AT 21:1
T 21,15:1:AT 21:21:1:AT 21,24:1:
T 21,27:1:AT 21,30:1:AT 21,30:1:
T 0,121

```

```

5750 LET C=VAL P#13 TO 14#

```

```

5760 LET B=VAL P#15 TO 16#

```

```

5770 IF P#17#="R" THEN FOR N=0
TO 30 STEP 3: PRINT AT C,A:1:0:1
NEXT N

```

```

5780 PRINT AT C,0:1:P#13#

```

```

5790 LET C=VAL P#15 TO 16#

```

```

5800 LET B=VAL P#17 TO 21#

```

```

5810 PRINT AT C,0:1:P#13#

```

```

5820 LET C=VAL P#17 TO 21#

```

```

5830 LET B=VAL P#19 TO 24#

```

```

5840 PRINT AT C,0:1:P#13#

```

```

5850 LET C=VAL P#19 TO 24#

```

```

5860 LET B=VAL P#21 TO 31#

```

```

5870 PRINT AT C,0:1:P#13#

```

```

5880 PRINT INVERSE 1:AT 0,3:1:P#
13 TO 3#

```

```

5900 PRINT INVERSE 1:AT 12,0:1:

```

```

=MENU          "IAT 13,01"=A=MOZH
OF CHORD="IAT 14,01"=B=HEAR CHORD
"
5910 INPUT T#
5920 IF T#="R" THEN RETURN
5930 IF T#="A" THEN GO TO 5430
5940 IF T#(">"# AND T#("<"# AND
T#("&="# THEN GO TO 5910
6000 IF I=2 OR I=1" THEN PAUSE
501 REEF 1,VAL P#140 TO 421: REEF
P 1,VAL P#143 TO 431: REEF 1,VAL
P#146 TO 461: REEF 1,VAL P#149
TO 531
6010 IF I=4 OR I=10 THEN PAUSE
501: REEF 1,VAL P#140 TO 421: REEF
P 1,VAL P#143 TO 431: REEF 1,VAL
P#146 TO 461: REEF 1,VAL P#149
TO 531: REEF 1,VAL P#152 TO 541
6020 IF I=12 AND I=17 AND I=27
AND I=310 THEN PAUSE 501: REEF 1
,VAL P#140 TO 421: REEF 1,VAL P#
143 TO 431: REEF 1,VAL P#146 TO
461: REEF 1,VAL P#149 TO 531: RE
EF 1,VAL P#152 TO 541: REEF 1,VA
L P#155 TO 571
6030 GO TO 5910
7000 REM # DATA #
9050 RESTORE 7000
9100 FOR N=0 TO 71 READ A: POKE
USR "A",A: A: NEXT N
9120 DATA 44,44,72,84,100,72,60,
84
9210 DIM C#130,871
9320 LET C#111="E A E A C#E 921
1 7242 72730000 A MAJOR-20-13-08
-03001004"
9330 LET C#121="E E E A C#E 921
E 000 000 123024 SEVEN-08-03001
000000000"
9340 LET C#131="E E A E A C E 427
1 9212 92430000 A MINOR-20-13-08
-03000004"
9350 LET C#141="F#E F#E D#E F#E
9152121234312274E MAJOR-18-13-04
-01003004"
9360 LET C#151="F#E D#E A E F# 421
1 9162 9243 9304E SEVEN-18-13-08
-03-01004"
9370 LET C#161="F#E F#E D- F# 930
1122721221315244E MINOR-18-13-04
-01002004"
9380 LET C#171="G C E G C E 427
1 92121218312174C MAJOR-17-13-08
-03000004"
9390 LET C#181="G C E G#C E 427
1 92121218312244C SEVEN-17-13-08
-03000004"
9400 LET C#191="H A B A B F# 924
1 9302122750000 B MAJOR-18-10-03

```

```

002000000"
9410 LET C#100="Y A B A C F# 42
71 9242 93030000 D SEVEN-18-10-0
300000000"
9420 LET C#111="X A B A D F 43
04 9242122730000 D MINOR-18-10-0
30000000"
9430 LET C#120="F E E G#E E 42
41 7182 92130000 E MAJOR-20-13-0
8-04-01004"
9440 LET C#130="F E E G#E E 42
41 7182 92132274E SEVEN-20-13-0
8-04003004"
9450 LET C#141="E E E G E E 92
12 71820000 0000 E MINOR-20-13-0
8-05-01004"
9460 LET C#150="F C F A C F 81
08 92421218312214F MAJOR-19-14-0
7-00000000"
9470 LET C#160="F C E#A C F 41
08 9242121830000 F SEVEN-17-13-0
F-03000005"
9480 LET C#171="F C F A#C F 41
8812183122130000 F MINOR-07-0400
0005000000"
9490 LET C#181="E E E G E G 71
8212132123040000 G MAJOR-17-13-1
0-07-01007"
9400 LET C#191="G E E G E F 43
04 7182122530000 G SEVEN-17-13-1
0-08-01005"
9410 LET C#1201="G E G G#D E 121
8818313132140000 G MINOR-17-14-1
0-05000007"
9420 RETURN
9500 FOR K=74 TO 134 STEP 18
9510 PLOT K,144
9520 DRAW 0,-80
9530 NEXT K
9540 FOR K=124 TO 72 STEP -14
9550 PLOT K,17
9560 DRAW 80,0
9570 PLOT K,144
9580 DRAW 80,0
9590 NEXT K
9600 PRINT INVERSE "IAT 2,91"E"
IAT 2,111"A" IAT 2,131"B" IAT 2,15
1"B" IAT 2,171"C" IAT 2,191"D"
9610 RETURN
9620 PLOT U,151 DRAW 0,15
9630 PLOT U+2,151 DRAW 0,15
9640 RETURN
9650 REM # OPENING/CLOSING #
# GRAPHIC #
9660 FOR A=0 TO 43: LET X=70+ABS
A: LET Y=70+ABS A
9670 PLOT 128,801: DRAW X,Y,P1: N
EXT A
9680 RETURN

```



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Program description

```

10  Set up variables
20  Main program. Screen drawn as follows
30  100 columns by 25 rows
40  100 columns by 25 rows
50  100 columns by 25 rows
60  100 columns by 25 rows
70  100 columns by 25 rows
80  100 columns by 25 rows
90  100 columns by 25 rows
100 100 columns by 25 rows
110 100 columns by 25 rows
120 100 columns by 25 rows
130 100 columns by 25 rows
140 100 columns by 25 rows
150 100 columns by 25 rows
160 100 columns by 25 rows
170 100 columns by 25 rows
180 100 columns by 25 rows
190 100 columns by 25 rows
200 100 columns by 25 rows
210 100 columns by 25 rows
220 100 columns by 25 rows
230 100 columns by 25 rows
240 100 columns by 25 rows
250 100 columns by 25 rows
260 100 columns by 25 rows
270 100 columns by 25 rows
280 100 columns by 25 rows
290 100 columns by 25 rows
300 100 columns by 25 rows
310 100 columns by 25 rows
320 100 columns by 25 rows
330 100 columns by 25 rows
340 100 columns by 25 rows
350 100 columns by 25 rows
360 100 columns by 25 rows
370 100 columns by 25 rows
380 100 columns by 25 rows
390 100 columns by 25 rows
400 100 columns by 25 rows
410 100 columns by 25 rows
420 100 columns by 25 rows
430 100 columns by 25 rows
440 100 columns by 25 rows
450 100 columns by 25 rows
460 100 columns by 25 rows
470 100 columns by 25 rows
480 100 columns by 25 rows
490 100 columns by 25 rows
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690 100 columns by 25 rows
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740 100 columns by 25 rows
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760 100 columns by 25 rows
770 100 columns by 25 rows
780 100 columns by 25 rows
790 100 columns by 25 rows
800 100 columns by 25 rows
810 100 columns by 25 rows
820 100 columns by 25 rows
830 100 columns by 25 rows
840 100 columns by 25 rows
850 100 columns by 25 rows
860 100 columns by 25 rows
870 100 columns by 25 rows
880 100 columns by 25 rows
890 100 columns by 25 rows
900 100 columns by 25 rows
910 100 columns by 25 rows
920 100 columns by 25 rows
930 100 columns by 25 rows
940 100 columns by 25 rows
950 100 columns by 25 rows
960 100 columns by 25 rows
970 100 columns by 25 rows
980 100 columns by 25 rows
990 100 columns by 25 rows
1000 100 columns by 25 rows

```

```

10 REM Set Up Variables
20 PAPER=0: BORDER=0: CLS: IN
K 4
30 LET lve=0: LET ve=0: LET a=
30 LET l=0: LET ve=0: LET h=2:
30 GO SUB 7000
35 LET p=0: LET l=0: REM
c(100)
40: LET l=0: LET h=0: LET
l=0: LET lve=0: LET ve=0:
LET drift=0: LET ge=147: LET a=
a=0: LET a=0
50 GO SUB 7000
70 PRINT AT 14,4: FLASH 11"x"
: AT 20,71"x" AT 17,10"x" AT
15,21"x" AT 19,24"x"
100 REM Run Program
110 INK 7
115 PRINT AT 0,0: INVERSE : I
NK 81"x/speed": "lve" : AT 0
,10"x/speed": "h" : AT 0,
21"x": INVERSE : INK 81 AT 0,
01"x": "a"
114 IF INT lve-h-2 AND : INT
ve-h-2 OR INT (a-h-2)
THEN GO TO 400
120 PRINT AT lve,ve: ORH
94
125 IF ATTE lve+ h ve, a=
a+ h drift+1 OR ATTE lve,
a= a+ h drift+1 THEN GO TO
500
130 LET p=a-ve: LET p=lve
140 LET a=a-a+ h drift
145 LET lve=lve+1: h ve:
ATTE lve+ h ve, a: : 13
21
150 LET drift=drift+1: INKEYS =
" " AND ge=147-1: INKEYS = " " AND
ge=147
155 LET down= h down+1: INKEY
= " " AND ge=147-1: INKEYS = " "
AND ge=147-1: INKEYS = " "
160 LET ge=ge+1: INKEYS = "2":
INKEYS = "B"
170 IF ge=147 THEN LET ge=147
180 IF ge=147 THEN LET ge=147
190 IF INKEYS = " " THEN LET l
=0
195 IF INKEYS = " " THEN STOP
,0,0
200 IF a=0 THEN GO TO
700
210 IF a=0 AND a=0:
THEN GO TO 740
220 IF l=0 THEN LET l=0
230 LET a=a+1: h down: LET a

```

```

440:4407
235 IF a < 0 THEN GO TO 250
240 IF line >= 12 AND a=0 THEN
GO TO 300
250 IF a=1 AND line <= 3 THEN
RESTORE #500: LET column=column
+J(1)+220+(1a+9530)+19*(1a+9570)+
19*(1a+9540)+4*(1a+9500): LET 1a
=9530: CLR : INK 4: LET line=10:
LET a=0: GO TO 40
270 IF 1=6 THEN BEEP .05,40: L
ET 1=0
375 LET 1=1+1
380 IF line <= 3 THEN LET line
=2
390 IF 1=0 THEN GO TO 300
400 PRINT AT 1,1,1" "
410 GO TO 100
500 REM [Change Screen]
505 LET column=INT column
510 LET 1a=9530+19*(column-0 AND
5 column-7)+29*(column-8 AND col
umn-13)+30*(column-12 AND column
-18)+40*(column-17 AND column-22
)+30*(column-21 AND column-31)
520 CLR : INK 4: LET line=0: RE
STORE 1a
530 GO SUB #500
540 LET a=4*(column-0 AND colu
mn-7)+21*(column-8 AND column-13)
+1*(column-12 AND column-18)+9*(
column-17 AND column-22)+23*(c
olumn-21 AND column-31)
550 LET a=12*(column-0 AND colu
mn-7)+9*(column-8 AND column-13)
+12*(column-12 AND column-18)+6*(
column-17 AND column-22)+4*(c
olumn-21 AND column-31)
560 PRINT AT 0,0: FLASH 11"R"
565 LET column=column+4*(column
-21)+30*(column-17)+30*(column-22)
+4*(column-31)
570 LET column=column+3: IF LET
a=1
580 GO TO 100
600 REM [Landing]
620 IF ga < 3: 147 OR v=10 THEN
GO TO 300
630 IF a=11+column < 1 THEN
GO TO 400
640 PRINT AT 21,0:"RESTRICTED
LANDING PAD. GO AWAY."
650 FOR i=1 TO 500
660 IF INKEY$="" THEN LET h
=0: GO TO 100
670 NEXT i: GO TO 300
680 PRINT AT 10,7:"SPEAT LANDI
NG!" AT 11,8:"CONGRATULATIONS!"
690 LET column+column=41: FOR i
=1 TO 40: FOR j=0 TO 100: BEEP .05

```

```

: j: NEXT j: NEXT i: RESTORE #500
: CLR : INK 4
692 LET score=100
695 LET pad=pad+3: IF pad=5 THE
N GO TO 300
696 GO TO 40
700 REM [Crossing Boundaries]
710 IF 1a=9530 THEN LET column
=1: GO TO 400
720 LET 1a=1+10
730 IF 1a=9590 THEN LET 1a=954
0
740 CLR : RESTORE 1a: INK 4
750 LET column=11a+9540+30*(1a
+9550)+120*(1a+9540)+19*(1a+9570)+
23*(1a+9540): GO TO 300
760 IF 1a=9530 THEN LET column
=20: GO TO 400
770 LET 1a=1+10
780 IF 1a=9530 THEN LET 1a=958
0
790 CLR : RESTORE 1a: INK 4
795 LET column=4*(1a+9540)+12*(
1a+9550)+17*(1a+9540)+23*(1a+957
0)+29*(1a+9530): GO TO 300
800 REM [Crash Landing]
820 PRINT AT line-1,column-11"
V's" AT line,column-11"-R." AT
line+1,column-11"V"
830 BEEP .05,50: BEEP .05,50: BEE
P .05,3
840 PRINT AT line-1,column-11"
" AT line,column-11" " AT
line+1,column-11" "
850 PRINT AT 10,7:"CRASH LANDI
NG!" LET a=1: IF a=0 THEN GO T
O 370
860 RESTORE #500: PAUSE 200: CL
R : INK 4: GO TO 40
870 PRINT AT 2,10:"Your Score:
"sc
875 PRINT AT 10,0:"
GAME OVER " AT 11,11
1"Press any key"
880 IF INKEY$="" THEN GO
TO 300
890 IF INKEY$="" THEN GO TO
370
900 REM
920 REM [Finish Game]
930 LET score=1
940 CLR : INK 7: PRINT AT 5,11
"Well done , you have landed on
all the pads with a score of "
AT 9,10: FLASH 11sc
950 IF a=0 THEN PRINT AT 10,5
,"Press any key to start:" PAUSE
50: RUN
960 LET a=1: LET 1a=1+10
970 PAUSE 200: CLR : INK 4: GO

```


Reader's reviews

Tell us what you think about the software that's on the market.

This feature provides space for you to air your views on any software, be it for the ZX80, ZX81 or ZX Spectrum. If you've had a good or bad experience of any of the commercial software packages available for your system, why not write and tell us.

Your reviews should contain your critical thoughts about the software and the relevant details concerning the availability of the package, the price etc. If you can provide any screen dumps to illustrate the review, so much the better. Any reviews published in this section of the magazine will be awarded with the game of the year you review. So, if you buy a cassette and want to give us your first published review, you'll get your software for free!

Ground Force Zero Titan Programs Guy Haines

The lengths to which some companies go to in advertising their product in terms of magazine space makes you think they have something special to offer. A full page advertisement of that type prompted me to buy Ground Force Zero from Titan programs. However, the game totally confirms my belief in the old adage 'you can't judge a book by its cover' or in this case, don't be influenced in purchasing programs by the advertising campaign behind it.

Ground Force Zero is written totally in BASIC, and suffers of the accompanying problems of programming in this language. On loading you are greeted with the 'Demonium' theme music and a second world war theme, dragging across the screen with a screen editor you select 1 of 10 levels of difficulty. Then at the bottom of the screen, airplanes of varying height are being constructed and when the bottom of the screen is fully occupied

by buildings your plane begins dragging along the top of the screen once again. As a game off one side of the screen it happens at the other but this time it is one less tower. Using simply the 'D' key you must drop bombs on the buildings knocking them down to the ground before your descending height causes you to collide with one.

Being written in BASIC, the graphics are crude and jerky and the necessity of having only a single key to press brings freedom almost immediately. In my opinion it is the sort of game that you feel you could have whipped up yourself and then put it on some tape and stored away never to be used again... it would appeal to the very young. However, their judgement on the right direction at which to drop their bomb but in today's market where to stay ahead in the software industry demands high standards, I am surprised that Titan Programs have not been renamed Titanic. As it is, the program is ludicrously priced but it did teach me a lesson. From now on, I'll find out what I'm getting before I part with any money!

Slippery Sid Silversoft P D Jones

The majority of programs available for the ZX Spectrum come in attractive packages and Slippery Sid is no exception. However, often an attractive cover can conceal a poor or even bug-ridden program. Fortunately this program lives up to its expectations. Basically simple in concept, the game is a highly addictive.

On running you are taken to a walled garden in which a number of frogs are enclosed. You take the role of Slippery Sid the snake and you aim to trip up all of the frogs. But beware! Every time you eat a frog a white toad will appear at random in the garden. Also the



more frogs you eat, the larger you grow and the harder it becomes to get around the screen. Occasionally a mega mushroom will appear and on eating this you can gobble up a toad and gain extra points. On eating all the frogs, the screen clears and you find yourself in the next garden which contains an extra wall. The game continues to follow with more walls and harder added each time you clear a screen. The control keys are well chosen and a high score can be achieved quite quickly. The battle is not over yet though as you have the choice of five levels of speed — from impossible to well nigh impossible!

All in all Slippery Sid is a very enjoyable game with good use of sound and graphics. I highly recommend it but would warn those of you who are worried that it can cause mental stress. I am still trying to get my wits away from the keyboard so that I can have another go. Slippery Sid is available from most good software stockists at £2.99.

3D Tunnel New Generation Software S Brookes

New Generation's latest contribution to the software market is the highly recommended 3D Tunnel. On the package there are two versions of the game available: 128 and 48K. The 128 version comes in

two parts, playing sequences and graphics modes which have to be loaded separately. The 48K version has the added attraction of a demonstration mode (which anyone could watch for a long time in fascination) and a Levelup Underground mode to avoid

This whole object of the game is to shoot as many assorted creatures as possible, and to avoid the underground (see 48K only). Points are awarded as follows:

| | |
|-------------------------------|------------|
| hitting a bat | 30 points |
| hitting a toad | 40 points |
| hitting a spider | 60 points |
| hitting a rat | 80 points |
| Avoiding the underground trap | 100 points |

Provision has been made within the program for the use of joystick control — Kensington Microdrive and AGP are to be used. If the user does not have this facility, the normal keyboard can be used with a varying combination of control keys.

When the program is loaded, you are greeted with an options page. This shows the selection of speeds available — fast, medium or slow. There are also practice modes for each phase of the game.

Phase 2 Creating spiders
Phase 3 Lapping toads
Phase 4 Snapping rats
Phase 5 London Underground train (48K only)



Any one of these modes can be selected along with the speed to start the practice sequence.

Highly recommended may be, but my first disappointment must come with the start of the game — the so-called 3D Tunnel is no more than swirling borders of colour whizzing towards you (depending on the selected speed). I would have liked to have seen, at the least, something points at the corners of the tunnel walls to give the new 3D perspective, although actual graphics within the game are superb.

My second disappointment came when I first started to play the game: the first phase, Flipping bats, has no real challenge out of my Spectrum for hours and minutes without managing to complete this phase. I find this very disappointing — surely the actual game is not another grey-toned mode!

At £5.95 3D Tunnel is good value to anyone who is prepared to sit at the computer for hours just to reach the other end of the tunnel.

Apocalypse Red Shift Greg Turnbull

Apocalypse is the new strategic wargame program for 2-4 players from Red Shift. The program comes in a shiny box with a full 16-page user manual. Tape into A loads the main program and the prompt to load one of the four available maps on side B (Europe, Great Britain, the Caribbean and London). Once the map is loaded you must select the play date from 0 to



7300 AD, the number of players, names (and symbols for the map display) then select the single carrier (of the 24 named official) each carries (and all squares) is worth between 0 and 9 (revenue points) depending on the location (lowest low can be built). These points are the currency of the game.

The screen shows the year and quarter, currently being played, player number and decision information; main map also symbols for each player's units, the player's points (total of all revenue points) and an optional overview of the current colour position (all surrounding squares). At the start of each quarter the power points give each player a revenue which he can spend on troops, war ships or nuclear missiles. There are four phases to each quarter:

- 1 Nuclear phase where units can be seen on the map and launched if required. If this is done, the target squares is destroyed and all 9 surrounding squares are void.
- 2 Deployment phase where the player can build up armies or fleets on the squares he owns.
- 3 Movement phase where the player can move any army he feels to occupy new territory (and so build up his total revenue points), or they attack another player's zone. (Movement of each force is limited to a certain amount for each turn). If an attack is made the Combat phase occurs where both players can choose a number (from 1 to 9) without telling each other the value chosen. The coin tosser who wins the conflict (alternatively the computer) can be left to make the decision.
- 4 Free Turn phase where a player may challenge the next to concede.

Golden Apple



During the main display there/when phases of the game, the exposed window is used to observe the strategic of each square (the is scored at a rate of 1 or 2 squares in any direction by the use of their level). Victory can be decided by the number of names of the nation captured, or the total number of revenue points built up, or the domination of the opponent's fortress.

The program is a complete wargame that can last from a few hours to a few days depending on how involved you get with it. As a highly addictive, lively, a new game facility is included. It is also easy to break in and for the program with LST 3, this is supported by Red Shift as they welcome any comments or improvements to the program and will even supply a listing if you need an aid.

If you get tired of playing on one map, there are three



others to choose from, although every game will of course be different — unless you decide games. Each map commands different tactics, the Caribbean needs warships and control of the ports, Great Britain relies more on the few strongholds. Asia, the Russian system does not have to be used in a game.

If after many weeks of play you need other maps or you are getting too used to them, there are expansion tapes available. Volume 1 contains maps for USA, 50 Asia, Africa, Arctic Circle, Star systems and further lands. Volume 2 has historical scenarios such as the fall of Rome, Napoleon's campaigns, the Pacific War and 1984. Red Shift say that they will be altering the rules of play as these further expansions are added to the interest for seasoned players. Plus if you need any help there is a telephone number to ring for advice from Dr Stangoravel.

Overall at £9.95, this is an excellent program which will give you many hours of enjoyment, especially as the game is constantly expanding and looking for when in which to be improved. As such, it is highly recommended but it must be noted that some of the recent tapes will not load due to 50 page tape degradation processes. If you get one of these tapes (as I did) then put telephone Red Shift and they will very quickly replace the tape.

The Golden Apple Artic Computing Stuart Rogerson

The Golden Apple is the title of Artic Computing's adventure

games and the first to include colour artwork. The program begins with a potential picture of the main locations of the adventure: a mountain house, a ship and a mountainous island.

The plot is simple — you are on quest to find The Golden Apple and on the way you must find thirteen treasures and a safe place in which to deposit them. This is not the kind of adventure where you are killed in every second location and meet strange monsters round every corner. Rather it is a test of wit, insight and ingenuity. You will find yourself looking water to fill a watering can to water seeds or fishing for salmon (assuming you find the net) and be left puzzling over the unpleasantly intricate.

The program understands over one hundred and fifty words and although a fairly standard level of adventure, it contains three new features: by Arto, by requesting instructions you are given a page of useful hints including some of the key words and advice on which adverbial entries are acceptable. Requesting help produces the message "What did Apple say first?" followed by Apple's address and the promise of a gift should if you really get stuck. Asking for your score not only produces an update on the treasure position but gives you a rating out of five. Finally, it tells you the number of turns you've had to go. The latter might seem a little but irrelevant touch but it isn't as if you discovered.

The whole point of adventure games is to explore new worlds and use your wits to survive, finding uses for the various objects you are lying around. This is a high quality adventure game which more than fulfils this aim. It is for the experienced adventurer only if you are an adventure game addict, as it is certainly not worth considering adding to your collection. It is not the 48K, Spectrum or ZX Spectrum or the ZX Spectrum. Use of Arto adventures on the Golem Apple is completely machine code and includes a save routine. Two hints, beware of sunset and don't be tempted by the nice safe bait!

Go To Jail Automata Philip Hickling

Go To Jail for the 48K Spectrum was originally marketed as "Apocalypse" but this



name was changed, if such advertisements are to be involved. The majority of the program is written largely in BASIC, with several machine code routines to scroll part of the screen on and off at a time, create fancy border patterns and the store and retrieve the screen from above RAMTOP on saving time loading up the screen.

The program simulates the board game for between two and five players — one can be the computer. It requested that one human can play against the computer. Whether the computer is an active player or not, it takes your time the rate of banker keeping account of all the player's money, property owned, and collection of fines and taxes etc. The game is sufficient in virtually all details to the original, even shown in the captions on the character card!

At any time during the normal course of play, the screen displays two and a bit space of a monopoly board in a large format, scrolling from left to right as the player advances. While at times this may be confusing, the sites are large and the text easy to read — if the whole board was to be displayed the information would be compressed to an unreadable degree. On the sites are shown the name, owner, rent and mortgage value. Also shown during a player's turn is the bank, giving details of the player's cash and mortgage value. If during the course of play a player becomes bankrupt, his property is reassigned by the bank and is up for auction, as happens when a player lends a property that is for sale and does not buy it. During these

auctions, the computer will make its own bids according to how highly it rates the value of the property.

The computer plays a fairly skillful game, especially when it has only one opponent. If the player has very little cash on hand, it will take advantage of offering the site up for auction then making a bid just higher than the player can afford as buying half the board at ridiculous prices!

The game incorporates various facilities. Players can trade with each other by passing the bank houses and hotels can be bought at will and the game can be saved at any time — usually at desirable features! There are very few unfavourable points in the program. It is possible in a couple of places to cheat but the computer does not use these and all that is needed to overcome them is a little skill discipline on the part of the player. The only major complaint I can make against the program is its limited size of board.

These drawings, however, are easily countered by the complexity of the program in other areas. Overall, it is an extremely good value for £8 and I can recommend it to both seasoned addicts and newcomers to the game site.

Avenger Abacus Programs Mark Davies

Dear readers, if you have been looking for an excellent strategy-type adventure, then I'll be delighted to recommend the Avenger. It's really the best available program I have seen available for the ZX Spectrum.

The game loads every time

and once loaded, multi automatically displaying the instructions and which keys to use. Then, when you have pressed 'or' as you are told, the next screen of instructions are shown and the points awarded for each target. You then enter the skill level and set off on your intrepid mission.

You fly over mountains, terrain, burning bombs or lasers at the ground. There are both accurate and the computer responds quickly to any depression (which is just as well) quoted mistakes are punished against you and are only destroyed by bombs whereas factories and missile pads can be destroyed by both sorts of ammunition. Watch out if you miss the guided missiles they are sure to get you!

Your plane can be hit, as can be five times before you are destroyed but it has built a missile count as two shots. You can also be killed by the atomic explosion resulting from the destruction of a power station. As if this isn't enough, interception will attack you from all directions and they are hard to destroy as you only have your laser for defence and they are no match for their rockets. If you manage to score more than \$5000 by this time your ship will be destroyed. Then you have beaten the planet at that level.

At the highest level, level 5, the game is very very hard. Not only are there more guided missiles and interceptions to deal with but your laser is shortened, making it much harder to destroy the interceptions. In addition there is a high score facility for every level and a bit more info which tells you the average hit you have made in your stored ship.

Avenger, at £14.95 from Abacus Programs is great value for money and really releases the full potential of the ZX Spectrum.

Manic Miner Bug Byte Bruce Boughton

This excellent title was a must for ALL arcade enthusiasts. At £5.95 it is well worth a couple of weeks pocket money.

While having a great deal by a complete collection of the words MANIC and MINER in large letters which alternate in colour. Once started we can hear a fascinating tune played on a piano keyboard with the

keys (usually being played).

On the (play) you are told that since Willy (that's a cat) has found a long-lost mine and has to bring up all the treasure he discovers there. We have a choice of keys, but I found that 0 is left, 1 is to go right and 2 is to jump (and 3 to place) are the best keys for the job. We also have a choice of having the Duke (that of the Mountain King) on or off while we play.

So, onto the game itself. On pressing 'enter' (the first one) the Duke (the Centurion) flashes up instantly. We are in the bottom left-hand corner and have to get all the keys that are placed in several positions around the rest of the screen. This is not as easy as it seems as there are hidden keys (poisonous) (only) buried all over the place which you can jump over or otherwise avoid as all costs 4 and mining (costs) must also be entered as an added price. Consequently, this also must be negotiated as well as disintegrating them. If there are not enough complications for you then I'll add that you have a limited air supply, which only takes about 2% minutes to run out.

If you safely get all the keys and manage to return to the bottom level, you can go through the tunnel down into the next stage. You get a bonus depending on how much air you have left with the keys at 100 points each if you get killed for the third time a boat comes down on the end of a very long line and steps on you. What a good deal!

If you make it through the first screen you have got another 10 levels more to go through before you reach home. Each one gives you a harder Cave 2, the 'old room' has penguins on its shores after you, and rather than tape into home to get somewhere. The third one, the 'Mangrove', obviously got its name from the three areas which eagerly parcel the different levels. Lastly spiders appear for the first time in this stage making it even harder.

My favourite stage (the last) I can call it 'Expansive' (the cave) is called 8. In this we must obtain five keys to get to the next level. There is a small round man with stubble legs and glasses and a clearly named after a certain well known programmer. He does He has to stop you getting all the bricks, as do the fabulous robots, which are complete with flapping wings.

The game is highly addictive as there is always the motivation to try and reach the next screen. Each one holds its own secret, which must be learned before any progress can be made.

What does it Matthew Smith for writing an ingenious program with such a great graphics and sounds to King Byte for making it. All in all, an excellent game for the BBC Spectrum.

Super C Compiler Softtek Mcode 2 Compiler PSS David Harrison

Wouldn't it be lovely to write a program in 'c' (which is surely BASIC), BASIC, and, at the push of a button, convert it to machine code to run at full speed 20 and 100 times the original speed? Well, that's what Softtek and PSS claim in their adverts for these two compilers. But do they work?

Both compilers cost £8.95 but each has its own characteristics and idiosyncrasies. There are some things, however, that both compilers have in common. Both work with integer numbers only and use the BASIC commands `PRINT` - `32768` or `32767`. Super C also handles numbers from 0 to 65535 as a simulated INPUT.

Most BASIC commands can be compiled with a few exceptions. Neither compiler can handle `LOAD`, `SAVE`, `VERIFY` or string arrays. However, Mcode 2 can handle strings (but not string pointers), whereas Super C can't. This is the big difference between the two. Also, the Super C manual does tell you how the task is done but it is totally involving PEEK and POKE.

Mcode 2 can also handle numeric arrays (one dimensional), `LEN`, `UPPER` and `LEFT`. Super C cannot cope with these but instead can use `STEP` in `FOR/NEXT` loops and `SCREEN` with `mem`, where Mcode 2 can't.

BASIC is special in each compiler giving an integer number between 0 and 32767. This is handy to work into a BASIC program but in Mcode 2, you can simulate the function with

`LET N = INT(32767)`

This is useful when testing your BASIC program before compilation.

REM, on both compilers, is just as very good use. On Super C, you can use REM to enable the `BREAK` key to run machine code (which follows the REM in the line, in decimal), or to save everything, including the program, without pausing the program (both compilers can save via REM).

On Mcode 2, REM can give a choice of the mode in which the compiled program will run.

- | | |
|--------|---|
| Mode 0 | Runs the fastest code disabling the <code>BREAK</code> key |
| Mode 1 | Runs longer and slower code by enabling the <code>BREAK</code> key |
| Mode 2 | Runs code that runs at almost the same speed as BASIC, with <code>TRACE</code> on |

By default, Mode 1 is chosen. Both compilers have good error messages if a bit confused at times. Only Mcode 2 gives you the number of bytes which your code takes up, after compilation. It seems that the only way to save a compiled program is to save the whole of memory, including code, compiler, work space, the etc. However, this is not difficult, and, with a microdrive, hardly time consuming.

One important point to note is that Super C allows only 1 to 2 as variable names (giving only 28 available variables). PORTING into memory Mcode 2 on the other hand happily accepts 'USER' 102 and 'BCODE' without question. Both compilers are called with simple BASIC `LIST` commands.

Finally, in documentation, Mcode 2 was supplied by return of post in a cassette case with an index-card size eight sides of manual. The reviewer, tells you enough to make full use of the compiler, including a full description of all the commands available.

Super C took more than three weeks to arrive, and was sent in a large package about the size of a video cassette box. Super C's manual can only be described as a work of art. Written by Tim Langstaff, it gives a superb description of everything about the compiler including the commands, the error reports and just about everything else, finishing off with a plug for the rest of their programs.

If I had to choose between these two very potential packages, I would prefer to use Mcode 2 from PSS, mainly because it can handle strings and can use more than 25

variables. It is also a little easier to use. However, since about June, Softtek have been producing an enhancement package for Super C allowing for string arrays, string pointers and floating point. This will probably push up the price to around £15.00. Whether this will ever become available we shall have to wait and see. At the moment, Mcode 2 still represents the best value for money.

For further information on the packages reviewed in this article you can write to the following addresses:

Silverware Ltd, London House
27/27B King Street, London
W6

New Generation Software
Freemont, Gifford Common,
Bristol BS15 6BN

Red Shift, 12c Manor Road
London N19

Amic Computing, Main Street,
Brydenborough, Wiltshire W9 3BQ

Automata UK Ltd, 66 Colston Road,
Portsmouth, Hampshire
PO2 2UL

Abacus Programs, 312
Llangresack, Truro, Cornwall
Truro TR9 3BT

Biglyte, Millbrook House,
Canning Place, Liverpool L1 3UL

Softtek Software, 328 Cranford
Road, London SE24

PSS, 442a Staines Station Road
Crowthorne RG9 5BG

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Down to business

Or how to make your computer earn its keep.



The DE Tronics keyboard.

Being determined to impose the quality of our living print, I bought a Shima DPM Centronics printer to do just that. Here, with all the ability to produce typewritten text easily, I wondered about using it and a computer as a word processor. At first I thought "get a 44C", but then I started wondering whether the Spectrum could cope with the job.

My next step was to scan the magazines and write to the companies who were producing suitable goods — this is the outcome of the somewhat ambitious project.

The hardware

With the printer, bought due to availability rather than choice, I

was faced to using a Centronics interface and Tascam's Keyboard and a suitable interface for this to try and I received a tape and letter from Microsoft Software saying that Code Technology had sent a interface. Unfortunately the interface never arrived.

Memotech supplied an interface and Home Graphics pack for the ZX81 and finally, DE Tronics supplied a keyboard. Fullal also offered one but at the time they were having problems — their keyboard finally appeared in the December ZX Micro

The keyboard

The DE Tronics keyboard is a sturdy — well-looking, black

sometimes high impossible, to connect onto to the user port. I had to take care to case to remove several pins from between the port and the specified system. Even so some units that had ridges which normally fit over the top of the Spectrum would not fit without major surgery. The only way to use items such as the Microdrive or the Home VLS system, which normally fit beneath the Spectrum, was to buy a ribbon cable extension.

Noting though these problems are, the keyboard is still worth having for general use and is invaluable for any serious typing on the computer.

Interfaces

It would probably have been much better if I had asked Peter Shaw to take them apart and given us the expert opinion. However here is the opinion of a electronics expert user.

Both the Tascam and the Memotech interfaces for the Spectrum are well based in fact-looking, robust, black cases with firmly fitting edge connectors. Both are also "dead enders" as neither have sockets at the back for further units to be plugged in. If you use several such units they constant changing is called for with the eventual loosening of the connectors. The Memotech unit is slightly longer than the Tascam and has a slight ridge at the top which normally fits over the top of the Spectrum case.

Both units performed perfectly when ILSBing, UNIBiting and making screen



The Tascam interface.

In this game you play the part of the harassed caretaker of a rather badly situated block of flats. Your job is to ensure that every window gets cleaned when dirty and repaired when cracked, using the buckets of water and spare panes of glass that are stored around the building. The difficulties, however, are that you cannot carry both water and glass at the same time, and that the windows keep getting dirty again before you and pigeons!! and cracked again (aircraft vibrations and vandals). If you manage to get the whole lot perfect (and don't fall off too many times in the process) you can go on to harder levels of the game, the object being to reach as high a level as possible.

How to play

Use keys Z and C to move left/right, keys H and J to move up/down. You must travel along the balconies and windows made up of invisible 'square' signs. If you try to do otherwise you will fall off and lose a life. To pick up water move towards a 'w' or for glass go towards a 'g' and, if the man will then flash with whatever has been picked up. When you are 'empty' the man flashes white (back) as you pick up lots you clean four windows and similarly wash panes of glass into you fix four windows. You can pick up as many as you like at one time but you cannot carry glass and water together (too dangerous) so if you already have water and then go to pick up glass you will lose whatever water you had left (shower over). Tactics are clearly needed to make the most of what there is.

To clean or repair a window just move towards it from either side or from underneath, using the same movement keys as usual. Whenever you manage to get all the windows clean together you are taken on to harder levels of the game, where the ladder pattern is more awkward and there is less water available.

Program operation

Lines 20-70 are the main-move subroutine. Since this is by far the most frequently used part of the program, it has been placed right at the beginning of the listing, and the variables used in it are defined before any others when the program is first run, this making all access times as short as possible. These considerations together with packing onto the screen rather than 'PRINT AT' make for a program compared in many ZX81

ASIC writer programs.

Line 40 checks for constant/constant overflow up water/glass/clean, and down/repair window. It does this by looking at the next space to be moved to and if this is not a ladder character (48) then the program is diverted to line 500-540 where, depending on what character is found, different actions are taken. Eventually a return command is hit which completes the original DO loop to the main move subroutine. The man's previous inner screen position is still held unchanged in the variable PP so that normal movement can resume next time around.

Lines 100 and 110 form a loop which constantly tells the main-move subroutine that the loop is occasionally broken out of. It allows the first set of lines to continue as follows: lines 200-280 check windows to be cracked or dirty again during the game. So as not to slow down movement during this operation, the main-move subroutine is also called. It last seen line.

Line 310 uses Fortran algebra to replace a long mass of a 16-bit-DO loop comparison. Lines 320-330, for example, take line 310 has found a dirty window? (grey character, code 8) and that the man has 'water' (w40) then line 500 is selected. This reduces water counts by one, then in line 540 the grey is PG88 with a space character to 'clean' it. Line 550 then looks to see if the next space is also a grey, if so PG888 it, if not PG888 the space before it. This is so that grey windows can be wiped from either side or even underneath and still give the same result. A similar procedure is followed for repairing cracked windows.

Lines 500-590 initialise variables. Lines 700-840 form a subroutine to draw the screen also used to redraw it full of broken windows at each new level of the game. Line 705 starts the DO loop number and goes on to a fixed place for each level of the game. Each screen therefore follows a different pattern of window cracking, but it is always the same for a given level. This is done so that players can eventually learn what to expect and develop tactics.

Line 850 causes the ladder pattern to vary between levels. Lines 900-990 the fall off routine. This replaces characters behind the man so his life.

There's been Zip, Zap and Pac-man, now here's Flatman, a race against grime by J Dave Rogers of Liverpool



Modifications

Graphics instructions have been limited to keep program length down, but readers may like to add their lines at the end of the program to do this. A few cosmetic comments might also be added at the end, depending what level the player managed to reach.

If you find the game too difficult

then change line 800 to print 32 graphic 'squares' instead of blocks, thereby giving the man extra access all along the bottom. If the game seems too easy, however, try slightly decreasing the value of 0.04 in line 110 as this determines how often windows are likely to be cracked during play.

Variables

| | |
|--------|---|
| PP | Present position of man. |
| S | Next intended screen position. |
| X | Makes the start of the screen in the display file. |
| E | Character of man. |
| Y | Character of next space if user tries to move off a ladder. This is used to decide whether man picks up water, picks up glass, clears windows, repairs windows or just falls off. |
| W | Water points. |
| G | Glass points. |
| FW | Perfect windows (0 to 301). |
| LPH | Used to generate random cracking/cracking of windows. |
| LE | Level of game. |
| N | FOR NEXT loop. |
| PS | Printing string, used to print horizontal walkways. |
| LPH/LR | Number of lives left: an screen indicator of this. |
| JD | At the end of line 880 is just an undefined variable to stop the program at the end of the game. |

A note or two

Graphics 'squares' are important characters in the program, but these can often look like inverse spaces when printed on paper, so please note the following very carefully when typing in.

Line 730 14 graphic shift P, 3 spaces, 3 graphic shift P
 Line 740 3 graphic spaces, eight various characters, 5 graphic spaces, 3 spaces, 3 graphic 'square'
 Line 760 Graphic shift S is used.
 Lines 780, 790 and 780 must have graphic 'square' at positions 4, 9, 10, 13, 16 and 25
 Line 810 4 graphic 'square'
 Line 830 3 graphic spaces, 3 graphic 'square'
 Line 880 32 graphic 'square', W

Since the program contains 'looker' it is liable to crash if typed in wrongly, so it is a good idea at first to print the code and start line 1030 and save a few copies of the program onto a cassette before it is used run.

Warning

This listing was not printed on a Sinclair printer and graphic characters have been replaced by a simple code. This consists of a number the number means only one character which is the number of characters needed, followed by 'g' to in-

dicate graphics mode, and finally a letter or number which is the key of the character. The code '1g' means inverse space or █.

These codes are combined with a '+' as a separator, so the code '2g+2g' means two inverse spaces and two characters obtained by graphics mode shift key A. Lower case messages are like typed in inverse mode.

I hope you will find this easy to enter, I know it is less than simple, but I think that you will agree with me that it makes the rest of the program easier to read.

```

1  REM J. DAVE, POWERS, WALTON, BT
5  GOTO 400
10 REM main 'loops'
20 FOR PP=1 TO 148
30 LET S=PP+(INKEY$="C")-(INKEY$="2")+(INKEY$="N")-(INKEY$="3")
40 IF PEEK S<148 THEN GOTO 30
50 LET PP=S

```

```

400 POKE S,X
70 RETURN
100 GOSUB 20
110 IF RANDI*4 THEN GOTO 100
200 LET S=S+INT (RAND*10)
210 GOSUB 20
220 LET P=P+INT (RAND*50)
230 GOSUB 20
240 IF RAND>.8 THEN LET H=H+100
AND S=H
250 GOSUB 20
260 IF PEEK (X+65536+P+1)-80 THEN
H LET P=P+1
270 GOSUB 20
280 PRINT AT S,P:CHRS H:CHRS H
290 GOTO 100
299 FOR SUBROUTINES:
300 LET Y=PEEK S
310 GOTO 320+180 AND Y=40+1210
AND Y=24+1180 AND Y=6 AND M=0:
+1200 AND Y=61 AND QL=0:
320 IF Y=0 OR Y=128 AND S=X+65536
THEN GOSUB 900
330 RETURN
400 LET M=M+4
410 LET QL=0
420 GOTO 450
430 LET QL=QL+4
440 LET M=0
450 POKE S,X
460 LET H=Y
470 RETURN
500 LET M=M+1
510 GOTO 530
570 LET QL=QL-1
570 IF M=0 AND QL=0 THEN LET M=
0
540 POKE S,X
550 POKE (S+1-12 AND PEEK (S-12)
+7)+1,80
560 LET P=P+1
570 IF P=30 THEN GOSUB 700
580 RETURN
599 FOR INITIATION:
600 LET S=PEEK (65536+256*PEEK 1
+12)*7
610 LET S=S+488
620 LET P=0
630 LET Y=23
640 LET T=1
650 LET W=0
660 LET QL=0
670 LET H=0
680 LET LE=0
681 POKE 16416,0
682 LET QS="32g4"
683 LET LIFE=4
684 LET LB=" 444"
685 GOSUB 700

```

```

690 GOTO 100
699 FOR SET UP AND SCREEN:
700 LET LE=LE+1
705 RAND LE=320
710 LET P=0
720 PRINT AT 1,0;"32g4"
730 PRINT TAB 7;"14g4+32+3g4"
740 PRINT TAB 43;"32g4g4+14g4g4"
+M+1+1+51+25+3g1"
750 FOR N=1 TO 6
760 PRINT TAB 40;"1+2g4g1+2g4"
+1+2g4g1+2g4g1+2g4+1+22+g1+/-
g1+2"
770 PRINT TAB 40;"1+4X+g1+Xg4g4"
+Xg4g4Xg4g4+X+1+16+Mg4g4g4g4
+g4"
780 PRINT TAB 41;"31g4g1+31g4g1+
31g4g1+21g4g1+31+15g4g4g1+/-g1"
790 NEXT H
800 PRINT AT 21,0;"321g4+68+06"
810 LET P=P+3+1
820 PRINT AT 4,13:PRINT AT 6,7:PEEK
AT 16,15:PRINT AT 10,15:P=P+1 TO 4
1:AT 15,3:P=P+6
830 IF LE=1 THEN PRINT AT 21,LE
43,10:P=P+3+3+3g1+2+P+6
840 FOR S=0 TO 20
850 PRINT AT 0,0;" M M"
860 PRINT AT 0,0:INT (RAND*145,7)+
INT (RAND*145):CHRS S:CHRS S
870 PRINT AT 0,0;" M M"
880 IF M=14+LE THEN PRINT AT 7,
21:"M+g1+M"
890 NEXT H
891 PRINT AT 0,0;"=====
=====AT 3,11LE
=====
892 GOTO 900
899 FOR CALL AND ROUTINE:
900 POKE S,Y
910 LET S=S+32
920 LET Y=PEEK S
930 POKE S,23
940 IF S=1725 THEN GOTO 900
950 LET P=P+488
960 LET LIFE=LIFE-1
970 PRINT AT 2,20:LE=1 TO LIFE+1
" "
980 IF LIFE=0 THEN RETURN
990 PRINT AT 0,0;"GAME OVER"120
1000 SAVE "FLATMAN"
1010 PRINT AT 3,7;"41444444 LEASE
3",,"STOP THE TAP THEN PRESS A
NY KEY",,"MOVEMENT KEYS ARE 2,6,
N AND 3."
1020 PRINT AT 3,7;"
"
1030 IF M=0 THEN GOTO 1060
1040 CLS
1050 RUN

```


Datafile

A multi-purpose file handling program from Nigel Salt in Kent.

Keeping records can be a tedious job — lots of data, alphabetical arrangements, etc. etc. But now in this convenient and versatile program you have at the last time that most filing operations will require.

Definite, Incessant or in both operations and in programming techniques. It is a relatively lightweight so that the operation of such system is expedient and has been well documented as Nigel for the operator to use.

Whatever your situation, job or need, Datafile will be of use. Type it in and then read the following instructions on using it.

Definite is a utility program which sets up a file in A4 in an accordance with the contents supplied by the user. The only limit is the number of records held is the size of the memory of your Spectrum. As 146K machines can only manage 32 records (20 characters long) but fields within each record can be any length and each

field can be given a name up to 8 characters long.

Twisted is a set of instructions designed to enable you to use this program by Definite in your own program. The sample installation program Letters on page 2 of your Datafile gives an example of one such application.

The user of these routines is, in effect, free. You might use them to set up a directory of your records and tapes or, indeed, this could require the Definite to keep track of all your business cards. This simple which follows guides you through every stage of Definite and explains the use of the routines.

Using the program

On using the LOAD command and playing role 1 of your tape you will be greeted with the main menu. Before you can use a file it must be defined in the following ways:

1. Select option from the menu. The program will take you to define your file. You can call it anything you like but for this example enter CLIENT.

2. Number of records. Once you have named your file the program asks you how many records will be on the file. It is defined in the menu to specify more than you think will be required to allow for future growth.

For this example enter 10. This will mean that only 32 records can appear on the file because Definite uses the first record to store information about the file and its structure. It is defined as: Each record can be up to 146K long. (20 records is, most likely, the limit) so greater than the maximum number of characters of data that you wish to store in each record. For the example enter 120.

4. Number of fields. What you enter here requires some thought. It is necessary to define one field for every item of data which you want to hold on each record. The default set may be deciding what constitutes an item of data.

Say you wanted to store the address of each client. You could specify just one field called any ADDRESS. This would not be very useful because then you would be unable to do any calculations of the address. A better alternative is to define one field for each line of the address and call them something like ADDRESS1, ADDRESS2 etc. to refer to address line 1 and so on. For this example enter 10.

5. Field default in. If you have followed the example instructions then the program will show tell you that the CLIENT file has 10 records of 120 characters each.



The program will then ask for a name and size for each field in the file. You can call the fields anything you like but only name more than 8 characters long will not be automatic. It is important that you give meaningful names to your fields to make future use of your file easier. There is no restriction on the length which you specify for each field provided that the sum of the field lengths is less than the record length which you entered at 3. (provided that above). For the example I suggest that you enter the following field names and lengths:

Name of field Length of field

| | |
|-----------|----|
| NAME | 8 |
| ADDRESS1 | 20 |
| ADDRESS2 | 10 |
| ADDRESS3 | 10 |
| ADDRESS4 | 10 |
| PHONE | 10 |
| ADDRESS5 | 8 |
| ADDRESS6 | 8 |
| ADDRESS7 | 8 |
| ADDRESS8 | 8 |
| ADDRESS9 | 8 |
| ADDRESS10 | 8 |

The total length of these fields is 118 characters which is less than the 120 character size which was entered at 3 above. After you have entered the data above you will have defined all of the 10 fields which you specified for each record at 4 above. You will now be returned to the main menu.

SPECTRUM PROGRAM

```

4000 VAL #B15,15 TO 131
5010 DIM #B15#,411 FOR #148,21
5020 FOR #10 TO 147-10000 STEP 1
5030 LET #B15#(10+#B15,148) TO
    #B15#40
5040 LET #11#(12+#1,10) VAL #B15,1
    #11#40 TO #11#140
5050 LET #11#(12+#1,20) VAL #B15,1
    #11#40 TO #11#400
5060 NEXT #
5070 RETURN
5080 REM *****
      DATA ENTRY SUB #
*****
5090 CLS : LET #*****# LET #B
    (1,1) TO 15# STEP #
5100 FOR #1 TO #
5110 PRINT AT #B1,01#(11) " "
    #B15#,11,1) TO #11,211) FLASH
    (1) " " FLASH #
5120 INPUT #B1 IF #B1 # THEN
    LET #B15#,11,1) TO #11,211#
5130 PRINT AT #B1,01#(11) " "
    #B15#,11,1) TO #11,211"
5140 PRINT
5150 NEXT #
5160 INPUT "ALTER ANYTHING(Y/N)"
    #B1 IF #B1# THEN GO TO 5200
5170 INPUT "ENTER MORE RECORDS (Y/N)"
    #1#B1 IF #B1# OR #B1# THEN
    GO TO 5200
5180 LET #B1,1) TO 131# STEP #
#
5190 CLS : RETURN
5200 REM *****
      # SAVE FILE #
*****
5210 CLS
5220 SAVE #B1 DATA #B1
5230 PRINT #1:"PREPARE FOR VENDOR
    LOCATION AND*****PRESS ENTER"
    # PAUSE 50 #
5240 VERIFY #B1 DATA #B1
5250 RETURN
5260 REM *****
      # LOAD FILE #
*****
5270 CLS : INPUT "FILE NAME" #B1
5280 LOAD #B1 DATA #B1
5290 GO SUB 5000
5300 RETURN
5310 REM *****
      #PRINT FILE DETAILS #
*****
5320 CLS : INPUT "HARD COPY (Y/N)"
    (1) #B1
5330 IF #B1# THEN OPEN # B, "P

```

```

5340 CLS : PRINT INVERSE #1:"FILE
    LB" AT 0,101:"START" AT 0,20:"E
    ND"
5350 FOR #1 TO #
5360 PRINT #B1,1, TAB 10#(1,1)
    TAB 20#(1,2)
5370 PRINT
5380 NEXT #
5390 PRINT "NUMBER RECORDS USED "
    #B1
5400 OPEN # B, "B"
5410 PRINT #1:"WANTS ANY KEYS TO
    CONTINUE" PAUSE #
5420 RETURN
5430 REM *****
      #PRINT WHOLE FILE #
*****
5440 CLS : INPUT "HARD COPY (Y/N)"
    (1) #B1 IF #B1# THEN OPEN # B,
    "P"
5450 FOR #1 TO #
5460 CLS
5470 PRINT TAB 10: OVERLINE #1:"
    RECORD NUMBER" (1)
5480 FOR #1 TO #
5490 PRINT #B1(1) TAB 10#(1,1)
    (1) TO #1,211) PRINT "
5500 NEXT #
5510 PRINT #B1:"PRESS ANY KEY FOR
    NEXT RECORD" PAUSE 50 #B1
5520 NEXT #
5530 OPEN # B, "B"
5540 RETURN
5550 REM *****
      #EDIT ROUTINE #
*****
5560 GO SUB 5000
5570 IF NOT #B1 THEN RETURN
5580 PRINT AT 10,10# FLASH (1) #
    #B1 "SORTING"
5590 LET #B1#
5600 FOR #1 TO #B1-1) IF #B1#1
    (1) #B1,1) TO #11#(211#(1) #B1,1
    (1) TO #11#(211) THEN LET #B1#1
    (1) LET #B1#(1) #B1#(1) LET #B1#1
    #B1 LET #B1#1
5610 NEXT #
5620 IF #B1 # 0 THEN GO TO 5640
5630 RETURN
5640 REM *****
      # ALTER ROUTINE #
*****
5650 GO SUB 5000 IF NOT #B1 THEN
    # RETURN
5660 GO SUB 5000 IF NOT #B1 THEN
    # RETURN
5670 CLS
5680 FOR #1 TO #
5690 PRINT AT #B1,01#(1) " "

```


Using J. Doolan

```

9900 REM *****
      * DELETE *
      * STRUCTURE TO HERE *
      * WITH FOUR PROCEED *
      * TO HANDLE FILE *
      * CREATED BY DATAPILE *
      *****
9901 REM *****
      * ADDRESS OF ROUTINE *
      * *****
      * GET FILE *
      * CONTENTS *
      * *****
      * -REMOVE NAME *
      * -REMOVE SPACES *
      * -READ HEADER *
      * -LOAD FILE *
      * -GET FIELD NO. *
      * -GET RECORD NO. *
      *****
9902 REM *****
      * GET FIELD VALUE *
      * FROM FILE *
      * VARIABLE *
      * RECORD NO. AND *
      * IS SUPPLIED BY *
      * THE SUB AT 9904 *
      * IS SUPPLIED BY *
      * THE SUB AT 9904 *
      * IS THE ARRAY *
      * DEFINED BY THE *
      * SUB AT 9904 AND *
      * IT HOLDS THE *
      * POSITION OF THE *
      * THE FIELD IN *
      * THE RECORD *
      *****
9903 LET q=FORM,FORM,1 TO FOR
      n,21
9904 GO SUB 9905
9905 RETURN
9906 REM *****
      * DATE RECORD *
      * VARIABLE *
      * IS A DATE IN THE *
      * FORMAT YY/MM/DD *
      * THIS FORMAT CAN *
      * BE USED TO HAVE *
      * SORTING BY DATE *
      * WITHIN DATAFILE *
      * BASIC *
      * ON EXIT FROM THE *
      * SUB IN HOLDS THE *
      * DATE IN DDMMYY *
      * FORMAT *
      *****
9907 LET q=q+q+1 TO 20
9908 LET q+1 TO 20=q+1 TO 20
9909 LET q+1 TO 20=q+1 TO 20
9910 LET q+q+1 TO 20
9911 REM *****
      * REMOVE TRAILING *
      * SPACES *
      * VARIABLE *
      * IS A FIELD GIVEN *
      * BY THE USER OR *
      * THE SUB AT 9904 *
      * THE ROUTINE REMOVE *
      * BE AT SPACES AT *
      * THE END OF THE *
      * STRING TO AVOID *
      * UNEXPECTED GAPS IN *
      * PRINTED TEXT *
      *****
9912 IF q+1 LEN q+1 THEN LE
      T q+1 TO LEN q+1 GO TO 99
      GO
9913 RETURN
9914 REM *****
      * HEADER READ *
      * VARIABLE *
      * RECORD,DATA FILE *
      * CREATED BY *
      * DATAFILE *
      * NUMBER OF PAGE *
      * POSITION OF EACH RECD *
      * NUMBER OF FIELDS *
      * NUMBER OF RECS *
      * USED *
      * WFOFF,1 HOLDS THE *
      * NAME OF FIELD *
      * ON THE FILE *
      * WFOFF,2 HOLDS THE *
      * POSITION OF THE *
      * FIELD WITHIN *
      * EACH RECORD *
      *****
9915 CLS 1 LET n=VAL a+1,2 TO
      41 LET n=VAL a+1,3 TO 79 L
      ET n=VAL a+1,5 TO 101 LET n
      =VAL a+1,11 TO 121
9916 REM 40(n,1) OR 41(n,2)
9917 FOR i=0 TO 40-1:GOTO 9918
      STEP 1
9918 LET 40(i,1)+13=a+1,34+1 TO
      14+1-21
9919 LET 41(i,1)+13=a+1,34+1
      4+1+2 TO 14+1-20
9920 LET 41(i,2)+13=a+1,34+1
      4+1+2 TO 14+1-20
9921 NEXT i
9922 RETURN
9923 REM *****
      * LOAD FILE *
      * VARIABLE *
      * THE NAME GIVEN *
      * BY THE USER TO *

```

SPECTRUM PROGRAM

```

      1 A FILE CREATED 0
      2 BY DATAFILE 0
      3 NAME THE NAME ON 0
      4 AND ON DATAFILE 0
      5 STORED FILED 0
      6
      7 *****
0070 CL0
0071 LOAD OF DATA ACCI
0072 GO FOR FILE
0073 RETURN
0074 SET *****
      1 AFTER KEY FIELD NO. 0
      2 AVAILABLE 0
      3 *** THE NAME OF THE 0
      4 FIELD TO BE FOUND 0
      5 *INFL.40 HELD THE 0
      6 NAMES OF FIELDS 0
      7 ON FILE 0
      8 *** THE NUMBER OF 0
      9 FIELDS CALLED ON 0
      0 IF IT IS ON FILE 0
      1 AND IF NOT THEN ON
      2 *****
0080 CL0
0081 LET F=0
0082 IF q= "" THEN RETURN
0083 FOR I=0 TO q
0084 FOR J=0 TO q
0085 IF ALL(1,2,3,4,5) TO FORN,21
0086 THEN LET F=0
0087 NEXT I
0088 IF NOT F THEN CL0 I FROM
0089 1 RECORDS WITH KEY VALUE "Iq"
0090 STOP
0091 RETURN
0092 IF NOT F THEN CL0 I FROM
0093 1 FIELD "q" NOT ON THE FILE
0094 STOP
0095 RETURN
0096 SET *****
      1 AFTER KEY FIELD NO. 0
      2 AVAILABLE 0
      3 *** THE NAME OF THE 0
      4 FIELD TO BE FOUND 0
      5 *INFL.40 HELD THE 0
      6 NAMES OF FIELDS 0
      7 ON FILE 0
      8 *** THE NUMBER OF 0
      9 FIELDS CALLED ON 0
      0 IF IT IS ON FILE 0
      1 AND IF NOT THEN ON
      2 *****
0097 IF q= "" THEN RETURN
0098 IF LEN(q)+1+2+3+4+5 >
1 THEN LET q=q+ " " GO TO 0077
0
0099 LET F=0
0100 FOR I=0 TO q
0101 IF ALL(1,2,3,4,5) TO FORN,21
0102 THEN LET F=0
0103 NEXT I
0104 IF NOT F THEN CL0 I FROM
0105 1 RECORDS WITH KEY VALUE "Iq"
0106 STOP
0107 RETURN
0108 IF NOT F THEN CL0 I FROM
0109 1 FIELD "q" NOT ON THE FILE
0110 STOP
0111 RETURN

```

Please send our most address from 1890, April
1891 Albany, New York Association

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| 8000-8100 | 1000 |
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| 9900-10000 | 1000 |

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P. V. TUBES

For further information, contact:

[illegible]

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1000

[illegible]

**SPECTRUM
NEWSFLASH**

Abstract

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Figure 1. Schematic representation of the experimental design. The subjects were divided into two groups: the control group and the experimental group. The control group received a standard training program, while the experimental group received a training program with a focus on the specific skills required for the task. The subjects were then tested on a series of tasks, and their performance was compared between the two groups.

| | 1980 | 1981 | 1982 |
|------|------|------|------|
| 1980 | 1981 | 1982 | |
| 1980 | 1981 | 1982 | |



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Journal of Internal Medicine 252: 105–112



Shoot and Decide is a game of luck and perception. There is a 5 x 5 grid on which is placed a number and you have to guess in which

to discover if a position. If you hit the marker then you will be told how many times within the 50 tentacles and asked if you

wish to play again. If you fail then you are told the correct position and offered another go. Decision Maker reminds me

of conversations with my parents! A nice humorous little thing which could keep a non-computer happy for hours!



Shoot and decide

Two ZX80 programs from Andrew Haslam to challenge and amuse.

DECISION MAKER

```

5 LET B=0
10 PRINT "DECISION MAKER"
20 PRINT "*****"
30 PRINT
40 LET K=RND(1)
50 PRINT "ENTER PROBLEM"
60 INPUT A$
70 IF B=1 THEN LET Z$="YES"
80 IF B=2 THEN LET Z$="I DON'T
KNOW"
90 IF B=3 THEN LET Z$="NO"
100 PRINT "QUESTION"
110 PRINT A$
120 PRINT "ANSWER"
130 PRINT Z$
140 PRINT "AGAIN"
150 LET B=B+1
160 INPUT B$
170 CLR
180 IF B$="YES" THEN GO TO 10
190 PRINT "QUESTIONS ANSWERED-
"10
190 STOP

```

```

SHOOT THAT TARGET.
? CLR
10 PRINT "SHOOT"
20 PRINT "YOU HAVE A TARGET I
50%)"
30 PRINT "AND YOU HAVE TO SHOT
AT THE MARKER"
40 LET R=RND(15)
50 LET A=RND(15)
60 LET X=10
70 PRINT "YOU HAVE "X%" TRYED
LEFT"
80 PRINT "ENTER ACROSS 11 TO
51"
90 INPUT A
100 PRINT "ENTER DOWN 11 TO 39
"
110 INPUT B
120 CLR
130 IF A=A AND B=B THEN GO TO
200
140 IF X=0 THEN GO TO 200
150 LET X=X-1
160 IF A=A THEN PRINT "ACROSS
IS CORRECT"
170 IF B=B THEN PRINT "DOWN IS
CORRECT"
180 GO TO 40
190 PRINT "WELL DONE "X%" TRY
S TAKEN"
210 PRINT "ACROSS="A
220 PRINT "DOWN="B
230 PRINT "AGAIN?"Y/N"
240 INPUT A$
250 IF A$="Y" THEN GO TO 7
260 IF A$="N" THEN GO TO 320
270 GO TO 230
280 PRINT "YOU RAN OUT OF BULLE
"
310 PRINT "IT WAS THIS..."
320 GO TO 210
330 PRINT "GOODBYE THEN....."
340 PRINT "FROM YOUR ZOMB...."

```

SKULL

It's a monster...

...and it's waiting for you

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HUNT THE TREASURE...

AVOID THE TRAPS...

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The ZX81 soft selection

In which Nick Pearce casts a critical eye over some of the latest software releases.



3D Grand Prix
— DK Tronics

Having recently spent a considerable amount of time on the Spectrum negotiating the various pitfalls of Police a Chiquetel Pig, I wasn't expecting too much of the ZX81 program — no colour, sound and chunky graphics (I must admit however that I was pleasantly impressed by the emulation from DK Tronics).

The screenshot is displayed

on screen and shows gear, speed and spin indicators and your fuel gauge. You have a perspective view of the track as from the driving seat of a Formula 1 racing car and see the other cars on the track as you pass them or are overtaken yourself.

Unlike Chiquetel Pig, car racing is no problem providing that your speed is not excessive. The car takes turns automatically, left and right allowing you to sit on the appropriate side of the track for overtaking. You do have control over the game (there are six of them), throttle and brakes.

Weather effects, mechanical failures and oil stops all feature in the game with each race lasting five laps, unless you succumb to one of the numerous hazards faced by the Grand Prix driver. I found that it required careful concentration to avoid crashing into the back of slower cars ahead for at 180 mph there is not much time in which to react!

An excellent emulation.

3D Grand Prix costs £4.95 and is available from DK Tronics Ltd, Unit 8, Shore Hill, Judds, Suffolk Walsley, Ipswich CB7 7 3AQ.



Cosmic Guerrilla
— Quicksilver

Cosmic Guerrilla is a fast thinking arcade type game. Contrary to the title, or the fantastic insert card, there are no on screen instructions but it is not difficult to play. May 6 moves you left, 7 moves you right and 0 fires. The speed of play is selected from a choice of three — I preferred the fastest of the three, action is very smooth and responsive at that level.

The object of the game is to defend your city from marauding space guerrillas — you shoot them down from your ship which moves along the base of the screen. As you knock out the leaders they leave their plunger firing the ship. As this test is interactive to your missiles and remains in the sky, it becomes more difficult to shoot at the guerrillas as the game progresses.

These guerrillas are not just silly little droids, they are programmed with some 'intelligence' and do not fly into

your missile tracks. They therefore can be quite difficult to destroy. I got rid of the first batch without too much trouble but the problems of fast successive waves appear. A score card is kept and the game ends with the loss of all three of your lives.

Another good buy from Quicksilver.

Cosmic Guerrilla costs £3.95 and is available from Quicksilver, Palmerston Road, Alton, 13 Palmerston Road, Southampton SO7 1LL.



Games V (Family Games)
— JRS

Games V contains two arithmetic games, **Snatch** and **Reckless**, both for the 180 ZX81, both of the programs incorporate a 'fast load' system. This effective technique means that loading time is cut from five minutes to about 60 seconds.

In **Snatch**, one to six people can play at varying speeds. The winner is the player who correctly identifies the murderer guilty of the crime

YOU'VE BLOWN YOUR ENGINE UP

YOU WERE IN 15TH POSITION
WHEN YOU CRASHED

PRESS 1 FOR INSTRUCTIONS
0 FOR GAME TRACK
R FOR NEW TRACK



presented at the infamous Romy Club. The computer sets the scene and circumstances of the crime. There are fifteen suspects and a total of sixteen clues in form of questions which may be asked of the suspects. The problem is that each suspect will only answer certain questions and will also lie in certain circumstances.

Only one accusation is allowed per player and a pen and paper to keep a record of the suspect's responses is essential. It takes a long time to sift through the evidence and then deduce the identity of the killer. I was absorbed for two hours and still got the answer wrong!

I would have liked the facility to print out the suspect list and the list of questions that option was not included in the review copy. Each game is different and takes only a few seconds to set up. All in all, *Bluff* is an absorbing, frustrating, family game.

Bluff is also a game for up to ten players with the computer as banker. To start, each player is given 100 francs and enters his or her name. Up to ten stakes are permitted in each game and bets are placed utilizing a very effective display of the roulette board. All the virtual bets can be placed from any individual number playing 35 to 1, to rouge, noir, pair, impair, man-que and femme playing even odds. The computer is in French to enable the light atmosphere. If your French is anything like mine you'll need the instruction sheet at hand for the first few games to give you the translation!

An impressive simulation — too chance!

Games V costs £4.95 and is available from JES Software, 19 Weydale Avenue, Weybridge, Surrey TW20 3JL.

AXIS SOFTWARE

ZX 81 — for 16K

CLASSIC 3



Classic 3 — Axis Software

The cassette contains three rather exciting games — *Hangman*, *Clash* and *Flow*. They are in the sort of games that the new ZX81 owner might try to program himself but they are good versions and run well.

Hangman offers a total of 400 words and there are three levels of difficulty — increasing difficulty being represented by six, eight and ten letter words. The letters tried are displayed on the screen throughout each game.

Clash is a version of the popular game in which you have to try and decipher a seven number code in the case chosen by your ZX81. The computer selects a four or five digit number made up of the numbers one to six. After each guess from the player the screen indicates how many numbers were absolutely correct and how many were correct but in the wrong place. A game to test your powers of logic.

In the well known game of *Flow* the screen displays three

MIKRO-GEN



ty blocks identified by the letters A to T. The player chooses two letters and the numbers under those blocks are revealed — if they don't match then they are hidden again. The object is to find all the pairs in as few tries as possible — a good memory training exercise.

These three control games from Axis Software on one cassette make *Classic 3* a good buy.

Classic 3 is available from Axis Software, 71 Brookfield Avenue, Leightonborough, Leics LE13 3EN.

Tampet — Mikro-Gen

Tampet is a fast moving arcade-type game. The object is to survive for as long as possible against a variety of aliens. There are five different types of alien which attack your ship from left to right across the screen, some fly around and others loom. The lasers of the LHM aliens are particularly difficult to avoid and cannot be shot down. You aim for a maximum number of points and have five lives.

Once you have successfully defended a sector on the left of the screen for a preset time, the aliens gradually die out and you start moving to the right to complete the sector. You must reach the right side of the screen avoiding the spikes! If things get too difficult then you can destroy everything on screen with your 'superweapon' but you only have one per sector and although it saves your life, it doesn't score any points.

There are five levels of play and I found even the easiest level difficult, mainly because the 'LHM' lasers invariably destroy you once they start to



home in on your ship. However, the action in *Tampet* is fast and smooth and the game performs well. At £4.95 it is a reasonable buy.

Tampet is available from Mikro-Gen, 7 Devonshire Cottage, London Road, Buxford, Herts SG8 2PD.

Community Chest — Artic

This is a condensed version of the popular property game and contains thirteen sites, community chestcards and a pot. The rules are broadly comparable with the board game, but the site prices and fines are much higher. You have £2,000 to start but with the prices ranging from £750 for the site and bond to £1950 for Mayfair, it takes a good few rounds of the board, passing GO or a lot of luck to become a man of property.

In *Community Chest* your opponent is the computer — it is also banker and dice throws. It takes all the moves and monitors progress. The board is displayed on screen throughout the game, a feature not included in some other ZX81 simulations which leave off the screen in favour of a larger site list.

If you haven't had a willing human opponent and wish to play against your ZX81, then this is a good version and well worth considering. It is not a full simulation but I like the way in which Artic display the board throughout the game.

Community Chest costs £4.95 and is available from Artic Computing Ltd, 16th Street, Manchester, Def Post RD3 6RD.



Screen illustration from *Classic 3*



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that's what you
get, winning.
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race to win through
the obstacles. The
winner may be 42 miles
that's what you
get, winning.
Full colour display.



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race to win through
the obstacles. The
winner may be 42 miles
that's what you
get, winning.
Full colour display.



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race to win through
the obstacles. The
winner may be 42 miles
that's what you
get, winning.
Full colour display.



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Club corner

Bombay Microcomputer Club

Dear ZX Computing,
We have recently formed a microcomputer user's club in Bombay, meeting on every second and fourth Saturday night at 8.00pm. Anyone who owns a personal computer, whether it is a Spectrum 2861, 2865-85, Apple, Commodore or any other Indian or foreign model can join.

The club is a very much a non-profit organisation with positive social aims — the main aim being to create a greater computer awareness in the city and we are organising lessons in BASIC and a 'Microcomputer Exposed' day.

In view of inadequate services available in this city we would welcome help in any form from other clubs and organisations. Looking forward to receiving newsletter-type magazines for our club, I am, yours sincerely

Ash H Mhale
Asst. Secretary
Microcomputer Users Club
C/O Indian Register of
Shipping
72 Maker Towers "D"
Cuffe Parade
Bombay 400 028
India

Microsoftware Club

Dear ZX Computing,
We have been privileged to write to you after reading a letter in Club Corner from Nathan Cathey's Ministry. To the best of our knowledge, we are the only one Spectrum user group in and around Malaysia that possibly even in Roman-dash. Microsoftware Club is open to Spectrum owners

throughout the UK. We communicate with each other via our bi-monthly magazine on cassette which costs £1.50 to members (£1.85) to non-members or £7.50 for one year's subscription (£10.00 to non-members). One thing that we all have in common is that we all own a Spectrum — an ideal means of communication.

MEMBER readers contribute to the magazine by sending letters, programming tips, programs and so on. They may ask questions or give the answers to other readers' queries. The most important aspect of all this is that we can help each other across the miles and thereby learn about the Spectrum that much faster. All programs may be listed and there are plenty of ROM screenshots for easy guidance. Spectrum owners may also be put in touch with other members in need in their own area if they so wish.

Through the magazine we can really club together and become the only Spectrum Users Multi-Club offering all these things and more in little cost. Anyone interested in our services should send an a/c for full details to the address below. Good luck with your magazine in 1984, it is by far the best!
Yours sincerely

T. Stanton
73 Alcock Road
Moseley
Birmingham B13

Aylesbury Computer Club

Dear ZX Computing,
With the large success in the variety of home computers over the last year, the Aylesbury ZX Computer Club has decided to drop the ZX from its name in order to cater for all types of microcomputer

As the main microcomputer club in the area, the Aylesbury group have found that despite the fact that it was primarily a Sinclair user group, users of other computers than the ZX series have been drawn to the club. With the influx of ZX users from its name, the club has formalised its interest in all makes of home computer.

The club will continue to hold weekly meetings at Quaker School (each Friday at 7.30 pm) and monthly meetings at the Mandeville Centre. Further information on the facilities offered by the club and its activities can be obtained from myself, so Aylesbury 830887.

Dr David Rowlands
Secretary
Aylesbury Computer Club

Sussex ZX Computer Club?

Dear ZX Computing,
I would like to see if there is a club in my area and if so, would like some information about it. If there is no existing group then I would like to start my own ZX Computing Club and see if more are interested enthusiasts that might like to join.
Yours sincerely

Dawn Bonfield
6 South Close
Southgate
Croydon
Surrey

Norwich Computer Club?

Dear ZX Computing,
I have been a reader of ZX Computing for four issues now and I have not seen any mention of a Norwich Computer Club. Is there a club in the Nor-

wich area? If not, I should be interested in starting one myself. Please contact me at the address below if you are interested. I own a 48K Spectrum.
Yours sincerely

Gregory Norton
The Village
Deodar Road
Norwich NR1 2PE

Carlisle Micro Computer Club

Dear ZX Computing,
May I use the good offices of your magazine to publicise the information of the Carlisle Micro Computer Club.

We meet on Friday evenings from 7.30 to 10 pm at Central Community Centre, and will be delighted to welcome any new members.

A secretary of the Club can be contacted on Carlisle 23014.
Yours sincerely

D Scott

If you feel, or are a member of a year club which caters for the Sinclair user, why not put your group on the map by writing to us at:

Club Corner,
ZX Computing,
1 Galloway Square,
London W14 3AL

All you have to do is to send us a letter with details of your club's activities (times of meetings, addresses of users to contact etc.) and we'll do the rest. If you publish a newsletter or club magazine, say if very much like to see that too.

And if you don't see a club in your area, why not start one up by writing to ZX Computing and stating if any like-minded enthusiasts wish to join you.

Lojix — Virgin Games

Written by Steve Wells for Virgin, *Lojix* is a very old game brought up to date for the computer. The game consists of a gridded square and various shapes that if put together correctly, will fit into the square. You first have to choose the shape you want to start with and then move a cursor across the grid — pressing a key will drop the shape into the grid. There is a facility to rotate your shape until it fits into the current place in the square.

The screen display and key operation are fine enough and you get the usual biography of the programmer on the *Lojix* Virgin keeps 50 pieces for every tape sold in a special bank on album and claim that if you can solve the puzzle and keep your sanity they will give you the entire contents of the account! If you do manage to crack the puzzle there is a section to fill in on the *Lojix* board. The instructions of the game.

Basically though, *Lojix* is just a jigsaw puzzle and I would have thought that a computer like *Virgin* would have come up with something a little more imaginative than this if you are told pieces like Mr. Web, you then find the evidence but if you prefer arcade-type games then I would not recommend it.

Lojix costs £9.95 and is available from Virgin Games, 67-69 Portland Road, London W11 1PT.

ZX Draughts — CP Software

ZX Draughts should have been called 'Artful' as there are more bugs in it than a terrorist head. I hope the last of their production model I managed to load it with little trouble and a chess board appeared on the screen.

Moves are made by simple co-ordinates (as told to us with a lot of chess games). This is where the trouble started most of the legitimate moves were greeted with "move impossible". I fiddled about for ages and made a few moves and when I took one of the computer's pieces it took my piece off the board. The damned thing cheats as well!

CP Software is at 17 Oxford Lane, Haslemere, Surrey GU27 0AB, Surrey.

Quicksoft

Clive Smith takes a look at a mixed bag of programs.



Wilfred the Hairy, Clive the Hungry! — Microbyte

A strategy game for the 486 machines — very boring and full of bugs. I did manage to play part of the game until I hit the bugs.

The screen displays a crude map of the world and you, being Clive, have to occupy as many continents as possible whilst your opponent, Wilf the aborigine, is trying to do the same. Your progress is mapped by a blue flag every time you make a move and, boy it is slow. Sorry Microbyte I was not very impressed.

Microbyte can be found at 19 Winchester Close, Larkfield, Suffolk.

Royal Birkdale — Hornby Software

As you can guess *Royal Birkdale* is a golf game. This is one of a series of golf courses you can choose from with each one based on the real golf courses with the same distances and hazards. You have a choice of 1 or 2 players and after entering your handicap you then choose which hole you would like to play first.

The computer then goes on to show the chosen hole from a birds eye view, probably not very exciting. Under the holes a score telling you what sort of distance it is from your ball to the hole.

You have a full range of clubs to choose from, eight aim plus a wind gauge, five woods and a putter. Before you tee off you have to enter whether you want to use an iron or a wood, each club of course will give you different distances. Once you have chosen your weapons, it then asks you how hard you would like to hit the ball by feeding in a % 100% will give a full power shot and 5% is a gentle tap. You are then asked if you would like a straight shot or if you would like to hook or fade the ball and the direction in which you would like to hit the ball is shown help.

There is a 260-degree protractor on the screen to help you choose the correct angle, once this is entered the ball is struck and a tracer shows

where the ball travels. If you happen to end up in the hole then an extra coin jumps up and down, I think you must have hit him on the head!

If you are an all round 'about 'em up' video game player then this is not for you. If you are a golf player and if the golf course is covered in snow or you have a broken leg then perhaps they may keep you interested.

Hornby Software is at 21 Redford Rd, Leeds.

River Rescue — Thorn EMI

This is one of the most ridiculous games I've played in a long time. Written in machine code, it has few, smooth, rolling graphics. It can be played by one or two players and each is given five boats.

The aim of the game is to drive a speed boat up a river stopping the crocs and aliens or your boat will break up and sink. The boat is armed with a machine gun which shoots the crocs or logs that are in your way. As various shapes along your route you have to land the boat alongside a pier and rescue a little man. There's one man per pier and once you have a boat load you have to sail upstream to the next pier. The boat can be made to move either side to left or up and down the river. There are five keys to use, Q, A, D, P and R to fire the gun although it is also joystick compatible.

Just when you think you are doing well an earthquake hits and drops trucks in your way. If you don't shoot them in time you will lose up. I have to confess that I have yet to rescue all the men. It looks so easy but it's not and it keeps me intrigued for hours.

Graphically it's not very exciting but it is polished well. One thing I appreciated with this game was the speed in which a new game is set up, unlike some where you get the software category's name flashing on and off the screen and a two minute wait to go with it.

The game has a scoring system and points can be gained by shooting the crocs or logs. Definitely worth a try to your local club to get yourself a copy.

River Rescue is priced at £9.95 and is available from all leading software shops.

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Competition

Have some fun and write a pun! Win a beautiful cabinet in this competition for all the family!

There comes a time when the family telly is being used just as much for the cartoonists as for the broadcast programs. Kneeling in front of the coffee table with heads around your feet and Mum/Dad/brother/sister/son/dog/cat/hamster/fish/bird/thing/that/mean/ing/about the program there is missing, you realise that the time has come to get a television set specially for the computer.

Once you have the set your problem then becomes where to keep it. Continually sitting it up and taking it apart, as well as being irritating, adds to the usual a/c/t test on your equipment.

So it is not careless light against domestic disharmony.

This issue we are offering as a prize, a beautiful computer cabinet from Marcol Cabinets which will keep all your equipment safe and safe. These cabinets are solid but attractive, made of teakwood, 61 1/2" wide, 42 1/2" deep and 82 1/2" tall high (36 by 16 1/2" by 32 1/2" inches). A sliding shelf keeps it possible and slides away effortlessly and a storage shelf provides space for cassette, books and other essential articles.

Inspiration

The idea of the competition came from J. Heath of Menzies, who suggests the following favoured rules to read known songs and lines:

To enter, all we want is your version of a computer age song, film or television program sent on the back of a sealed envelope or postcard with your name and address.

As humour, especially puns, comes from person to person the winner will be the one which appeals most to the Editor (that's me). A surprise parcel is on the way to Mr J. Heath as appreciation of his idea for this competition.

Marcol Cabinets are in his hand at PO Box 88, High Street, Southampton SO9 7SD.

The rules

- This competition is open to all UK and Northern Ireland residents of ZX Computing as past employees of Angus Specialised Publications Ltd, their printers and distributors and employees of Marcol Cabinets. This restriction also applies to employer's families

and agents of the companies or anyone else associated with the competition.

- As long as the correct coupon is used for each entry, there is no limit to the number of entries from each individual.

- All entries must be postmarked before May 31 1984. The final prize will be awarded to the first correct entry posted at random.

- The winner will be picked by the Editor of ZX Computing. No correspondence will be entered into with regard to the results, and it is a condition of entry that the Editor's decision is accepted as final.

- The winner will be notified by post and the results of the competition will be published in a future issue of ZX Computing.

Address your entries to

**ZX Computing: Write a Pun
1 Golden Square
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Results

Many thanks for all the entries we received to the Words game competition in the Easter issue of ZX Computing. We had literally thousands of entries and most of them were correct. The answer to the puzzle was 17 software titles, including that well known text and graphic adventure game, the World.

Congratulations to Robert Stokes of Bolton, M Gail of Cleveleys Sea, M Bailey of St Andrews, Jeremy Howden of Worcester, S Hobson of Huddersfield and Stephen Moran of Carlisle who were the first six correct entries picked from the hat. Each of the lucky winners will receive a unique ZX Computing and Nations Software Partners T-shirt and seven Super Visions soft ware packages for the ZX Spectrum.

Thank you to everyone who entered the competition - better luck next time!

THE INTERNATIONAL VIDEO GAME OF THE YEAR COMPETITION
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\$100,000 FIRST PRIZE! **FIVE** \$15,000 BLINKER-UP PRIZES!

Design a totally original new video game in one of these categories: SPORTS, SIMULATORS, ARCADE, STRATEGY. ADDED BOUNTY is a special section which covers programmes that are not necessarily games but have outstanding educational or entertainment value. Subscribers announcing a number of "sell off" events which will benefit in carrying the message. An International Video Game of the Year (MAG) Award on their video packaging. It's a great challenge. And the rewards, both financially and in terms of prestige, are tremendous. This is the most exciting competition ever for creative computer and video enthusiasts.

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ENC 1

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Maniac

A fruit munching menace from Suffolk programmer, M Parrish.

OK, partners, down here in Suffolk we have a problem with a weird little rat like beastie who eats out fruit that is pretty fatal to touch. Our solution is simple: shoot the varmint! But, could you tell him?

Well there is only one way to find out, type in this program and try for yourself. We give you four lives to start and you will lose one if you collide with a muncher or if a muncher eats 1000. You score 10 points for each muncher you destroy and 10 points for each fruit you shoot. On clearing a complete stage you are awarded a bonus of 50 points.

The muncher's task is much more difficult, at least in the early stages, as he gets 10 points for each fruit eaten, 50 points for getting past you and 100 points if he touches you.

Can you survive all four stages? Each is more difficult than the last and every 1000 you score will restart the sequence. To move your man use keys B and 7 for down and up and Q to fire.



Program construction

Here follows a guide to the construction of Maniac Munchers.

| | |
|---------|---|
| 4-65 | GD SUB for graphicsGD TO intro and initialise variables |
| 45-551 | Main loop |
| 552-553 | Event! Lose a life, check for end of game |
| 554-555 | Muncher gets past man |
| 556-557 | Graphics GALL |
| 558-559 | Theme CAPS (BAPT on intro, add variables and screen |
| 560-561 | Reuses variables and stage after loading |
| 562-563 | 1000 |
| 564-565 | Sets up four random fruits and updates screen |
| 566-567 | Increase difficulty by reducing time in slot |
| 568-569 | End game routine |
| 570-571 | Shoot muncher routine |
| 572-573 | Check for hit on fruit or muncher |

```

1 REM *****
2 8 NARFAC MUNCHERS 8
3 6 37 6
4 6 MICHAEL PARRISH 6
5 *****
6 GD SUB 500
7 GD TO 1250
8 REM *****
9 REM 8 LETTERS IN BUSTED 8
10 8 THAT ARE NOT WORDS 8
11 8 ARE ENTERED IN 8
12 8 GRAPHIC MODE. 8
13 *****
14 LET J=0% LET V=0% LET A=
15 LET B=3
16 GO TO 43
17 50% SCORE*****
18 PRINT AT 0,0: PAPER 0: INK

```

```

21"CB SCORE "111AT 0,12: PAPER 0
22 INK 7: INK "" SCORE "1r
23 RETURN
24 REM STAGE 1: 00 SUB 2000
25 PRINT AT 10,20: BAK 2: FLAG
26 IF "STAGE 1": GD SUB 2000
27 PRINT AT 10,20: " "INT
28,01" "AT 17,01" "
29 RETURN
30 GD SUB 35
31 GD SUB 40
32 REM MAIN ROUTINE *****
33 LET q=INT (RND*30)
34 IF q=0 THEN LET q=12
35 IF q=1 THEN LET q=2
36 FOR n=1 TO 0 STEP -1
37 IF q=0 AND n=4 THEN LET n=
38,01: GD SUB 2000

```



```

40 IF g=a AND h=b THEN LET i=
1-100: GO SUB 2100
70 IF g=a AND h=b+2 THEN LET i
=1-100: GO SUB 1900
71 IF g=a AND h=b THEN LET i
=1-100: GO SUB 2050
80 PRINT AT g,h INK 0;"00":
BEEP .009,40: BEEP .009,20: PRIN
T AT g,h INK 0;"00"
100 IF h=2 THEN LET i=1-50: GO
TO 900
105 IF r1=a AND r1x THEN LET j
=2-1: LET rrr=40: GO TO 30FF
107 IF r1=b AND r1x THEN LET j
=1-1: LET rrr=40: GO TO 3000
109 IF r1=c AND r1x THEN LET j
=1-1: LET rrr=40: GO TO 3500
170 IF r1=a THEN GO TO 1500
175 IF i=1000 AND i=1000 THEN
LET i=1-100: LET t=t-1: BEEP 1
,0: BEEP 1,10: BEEP 1,-10: GO TO
990
200 IF INKEY="0" THEN GO SUB
9999
210 IF g=a AND h=b+1 THEN LET
i=1-100: LET t=t-1: GO TO 900
211 IF g=a+1 AND h=b+1 THEN LE
T i=1-100: LET t=t-1: GO TO 900
250 LET a=-(INKEY="6")-1*INKEY
a+77
270 IF a<2 THEN LET a=2
310 IF a>17 THEN LET a=17
320 IF a<1 THEN LET a=1
350 PRINT AT a,h INK 1;"R"1AT
a+1,h+2;"R"1AT a+1,b+1"1AT a+2,b+1
"
990 NEXT h
991 GO TO 50
992 REM HUNCHER HITS TO YOU!!!!
993 PRINT AT a,h INK 2; FLASH
1;"R"1AT a+1,b+1 INK 2; FLASH 1;"
0"
994 FOR i=50 TO -20 STEP -3
995 BEEP .009,1: NEXT i
996 GO SUB 30
997 IF i<3 THEN PRINT AT 13,0;
"1AT 13,0;"
998 IF i<2 THEN PRINT AT 0,0;"
1AT 0,0;"
999 IF i<1 THEN PRINT AT 4,0;"
1AT 0,0;"
999 IF i<0 THEN GO TO 4300
994 PRINT AT g,h;" "
999 GO TO 50
991 REM HUNCHER GETS FRUIT!!!!
992 FOR i=40 TO 0 STEP -3
993 BEEP .009,1: NEXT i
994 PRINT AT g,h;" "
999 GO SUB 30

```

```

915 GO TO 50
947 REM DATA FOR GRAPHICS!!!!
"
970 FOR u=0 TO 140
980 REM u1 FOR USER "a"1u,u
990 NEXT u
1000 DATA 124,126,128,40,126,100
,179,231
1100 DATA 0,0,0,0,14,20,250,234
1104 DATA 40,127,255,15,31,43,10
0,8
1110 DATA 1,224,244,240,240,240,
32,44
1120 DATA 0,224,240,255,240,240,
32,14
1130 DATA 0,0,40,127,255,255 101
0111,255,127
1141 DATA 40,127,255,255,255,127
,4,2
1150 DATA 4,107,107,20,42,42,42,
30
1160 DATA 12,8,110,255,255,124,4
0,24
1166 DATA 0,0,0,224,240,240,244,
224
1167 DATA 0,12,4,15,15,31,47,71
1168 DATA 0,96,32,254,255,255,11
110101,255,254
1160 DATA 40,255,90,40,34,255,10
0,109
1161 DATA 1,30,50,118,230,220,24
0,512
1160 DATA 0,0,24,14,102,255,255,
102
1170 DATA 0,0,0,0,0,0,204,0
1175 DATA 107,107,40,102,102,102
,34,251
1180 DATA 40,255,50,43,40,42,127
,107
1200 RETURN
1290 REM INTRODUCTION!!!!!!!!!!!!
1291 BORDER 7: PAPER 7: CLS
1292 IF INT (PEEK 23456/8)-20*INT
(107*(PEEK 23456/8)/2) THEN GO
TO 1294
1293 GO TO 1295
1294 POK 23456,PEEK 23456+6
1295 PRINT AT 10,0; "
GO YOU HIGH TO HAVE INSTRUCTIONS
" / "
1296 IF INKEY="M" THEN CLEAR 1
GO TO 1290
1297 IF INKEY="Y" THEN CLEAR 1
GO TO 1299
1298 GO TO 1294
1299 PRINT AT 0,0 INK 2; "
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
1AT 0,0 INK 2; "
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!"

```

```

1AT 18,01 INK 21
"
1300 PRINT AT 2,01 INK 11
"Stop the MUNCHER eating your
fruit You have four lives you
will lose one of these for ever
y1000 the MUNCHER score" a, You
will also lose one life if you
collide with the MUNCHER"
1310 PRINT AT 11,01 INK 11
"Here are four stage's each mor
e difficult than the last
The stage's will repeat with
every 1000 points you score"
1340 PRINT AT 20,01 INK 01 FLASH
11"PRESS 'C' TO CONTINUE"
1350 PAUSE 50
1360 PRINT AT 20,01 INK 11"NEXT
21,01 INK 11"21" PAUSE 50: PRIN
T AT 20,01 INK 11"NEXT 20,11 IN
K 11"NEXT 21,01 INK 11"NEXT 20
,21"
1370 PRINT AT 20,11"
"NEXT 20,01 INK
11"NEXT 21,01 INK 11"21" PAUSE
20
1380 IF INKEY$="C" THEN PRINT A
T 20,01 "NEXT 21,01" GOTO 13
70
1390 GOTO 1340
1400 PRINT AT 2,01 INK 01 "Y
ou will score '10' points for e
ach MUNCHER you destroy '10' p
oints if you shoot one of the f
our fruits that will appear at r
andom and a bonus of '50' for e
ach stage you complete"
1420 PRINT AT 11,01 INK 01 "
As in the early stage's the
MUNCHER task is considerably
more difficult than your's he
score's '50' for each fruit '50'
if he get's past you and '100'
if he hit's you"
1430 PRINT AT 21,01 INK 21 FLASH
11" PRESS 'P' TO PLAY "
1470 FOR a=20 TO 0 STEP -1
1470 PRINT AT 21,01"20" GOTO 1
480,20: PRINT AT 21,01"00" GOTO
1480,20
1484 IF INKEY$="P" THEN GOTO 1
490
1490 NEXT a
1494 PRINT AT 21,01" "
1498 GOTO 1470
1498 BORDER 4: PAPER 4: INK 1: C
LS
1511 FOR a=0 TO 21 STEP 1
1520 PRINT AT a,01 INK 01
"0000 LUCK 0000 LUCK
"1 BEEP .03,a
1530 NEXT a
1534 FOR a=21 TO 0 STEP -1
1535 PRINT AT a,01"
"1 BEEP .03,a
1536 NEXT a
1537 PRINT AT 0,01 INK 21 PAPER
01"20
NEXT 10,01 INK 01 PAPER 41"
PLEASE ENTER YOUR NAME"2AT 3
,01"UP,.."2 BORDER...A FIRE.
..0 "
1538 INPUT a$
1539 PRINT AT 10,01"
"NEXT 3,01"
"
1400 LET a=1000: LET a=240: LET
a=311: LET b=500: LET a=551: LET
q=500: LET a=551: LET s=0: LET
r=0: LET t=4
1401 PRINT AT 4,01"NEXT 3,01"20"
1AT 5,01"NEXT 3,01"20"1AT 12,01"
NEXT 13,01"20"1AT 14,01"NEXT 17
,01"20"
1403 FOR a=1 TO 21 STEP 2
1403 PRINT AT a,11 INK 21"1"
1405 NEXT a
1407 FOR a=2 TO 20 STEP 2
1407 PRINT AT a,11 INK 41"2"
1410 NEXT a
1414 GO SUB 2070
1418 GO SUB 2080
1420 GO SUB 2090
1422 GO SUB 2100
1430 FOR a=0 TO 21 STEP 1
1430 GOTO 10
1439 REM RE-set stage's
1440 LET a=1000: LET a=1000:
LET b=1000: LET a=1000
1410 LET a=1000: LET q=1000:
LET a=1000
1513 FOR a=21 TO 1 STEP -1
1513 PRINT AT a,14 PAPER 41"
"1 BEEP .03,a
1520 NEXT a
1522 PRINT AT a,a1 "NEXT a,b1"
"NEXT a,1,b1"
1523 GOTO 10
1530 REM END FRUIT
1531 GO SUB 20
1532 LET a=INT CHR$(170)
1533 BEEP .01,20
1534 IF a=0 THEN LET a=4
1535 IF a=1 THEN LET a=15
1536 PRINT AT a,121 INK 11"0"
1537 RETURN

```

SPECTRUM GAME

```

2001 GO SUB 30
2002 LET a=INT (RND*17)
2003 BEEP .01,30
2004 IF a=0 THEN LET a=6
2005 IF a=1 THEN LET a=8
2006 PRINT AT a,10: INK 4;"a"
2007 RETURN
2011 GO SUB 30
2012 LET p=INT (RND*17)
2013 BEEP .01,30
2014 IF p=0 THEN LET p=7
2015 IF p=1 THEN LET p=13
2016 PRINT AT p,4: INK 0;"p"
2017 RETURN
2102 GO SUB 30
2104 LET a=INT (RND*17)
2105 BEEP .01,30
2106 IF a=0 THEN LET a=6
2110 IF a=1 THEN LET a=8
2112 PRINT AT a,8: INK 2;"a"
2114 RETURN
2477 REM STAGE CHANGE=====
#
2500 FOR Q=-20 TO 50 STEP 3
2510 BEEP .05,5
2520 NEXT Q
2530 RETURN
2577 REM STAGE 2:=====
2600 PRINT AT 21,10: INK 2: FLAG
# 1:"STAGE 2"
2702 GO SUB 30
2730 GO SUB 2500
2740 PRINT AT 21,10: " "
3000 PRINT AT 9,4: " "
3001 LET v=20
3002 FOR w=225 TO 200 STEP -1
3010 PLOT w,0: INK 4: DRAW 0,167
: BEEP .007,-30
3020 NEXT w
3030 GO TO 50
3300 REM STAGE 3:=====
3302 GO SUB 30
3305 PRINT AT 21,10: INK 2: FLAG
# 1:"STAGE 3"
3306 GO SUB 2500
3307 PRINT AT 21,10: " "
3310 PRINT AT 9,4: " "
3320 LET v=14
3330 FOR w=200 TO 150 STEP -1
3340 PLOT w,0: INK 4: DRAW 0,167
: BEEP .007,-30
3345 NEXT w
3350 GO TO 50
3600 REM STAGE 4:=====
3510 GO SUB 30
3520 PRINT AT 21,10: INK 2: FLAG
# 1:"STAGE 4"
3530 GO SUB 2500
3540 PRINT AT 21,10: " "
3550 PRINT AT 9,4: " "
3560 LET v=10
3570 FOR w=125 TO 100 STEP -1
3580 PLOT w,0: INK 4: DRAW 0,167
: BEEP .007,-30
3590 NEXT w
3600 GO TO 50
4177 REM YOU LOSE:=====
4200 BORDER 4: PAPER 6: INK 0: C
LE
4205 FOR t=0 TO -30 STEP -1
4206 BEEP .01,t
4207 NEXT t
4208 BEEP 1,0: BEEP 1,-30: BEEP
1,0: BEEP 2,-30
4210 PRINT AT 9,0: "HARD LUCK "
a$:" GO YOU "
4215 PRINT AT 12,0: "WHICH TO HA
VE ANOTHER GO..." OR NOT....
....."N"
4219 PRINT AT 0,0: PAPER 0:
"
4218 GO SUB 30
4220 IF INKEY="a" THEN GO TO 4
4230 IF INKEY="w" THEN STOP
4240 GO TO 4220
4485 REM YOU SHOOT:=====
4490 BEEP .007,20
4577 FOR i=0 TO 40 STEP 4
5000 PRINT AT 9,0: INK 2:"EL": #
BEP .007,1
5005 NEXT i
5006 PRINT AT 9,4: " "
5008 PAPER 50: GO SUB 30
5009 PRINT AT a,b+10: " "
5010 GO TO 50
5555 REM YOU FIRE:=====
5577 PRINT AT 9,0: INK 0:"F"
5770 PRINT AT a,b: INK 1:"B"
a+1,0: INK 1:"R"
7000 LET a=a+2
7002 FOR a=a+2 TO v STEP 5
7004 IF a=7 THEN LET r=a+10: GO
SUB 2500
7007 IF a=7 THEN LET r=a+10: GO
SUB 2100
7008 IF a=7 THEN LET r=a+10: GO
SUB 2050
7009 IF a=7 THEN LET r=a+10: GO
SUB 1990
7010 PRINT AT a,c: INK 0:"FFFF"
: BEEP .007,40
7021 PRINT AT a,c: " "
7022 NEXT c
7023 PRINT AT a,b+10: " "
7025 IF a=7 THEN PRINT AT a,b+1
: INK 1:"B": LET r=a+10: GO TO 4
500
9030 RETURN

```


All change

Undergo a character change with the aid of Paul Matthews of Avon.

There are many occasions when an alternative set of characters is a very useful option: professional titles and Gothic style lettering for some programmed adventure games to name but two!

This program will allow you to redefine the entire character set and User Defined Graphics and to look at any 8085 to 8086 character at eight times the normal size. A simple machine code routine is used here within the program to copy the ROM character set to RAM. Notice that the pro-

gram takes into account the memory size and makes up appropriate **NAMETOP** changes with the **CLEAR** command.

Paul has made use of 8085 characters to explain the various sections of the program, you may leave these out of course, especially if working with 18K, but they are valuable when trying to debug any typing errors.

This is a good example of careful programming (although no doubt someone will find a way to crash it if they try) and Paul has taken great care to

make it as clear proof as possible (should you eventually break the program) it is quite safe to RUN it to restart and you will not lose your redefined characters. When you are using the program be careful not to press '1' from the main menu as it will set the will wipe out all your special characters.

One very useful feature is that when using these redefined characters, **SCREEN** will recognise them if you use **SCREEN** to look at the normal character system.

SCREEN can be used to detect collisions etc.

Variables used

| | |
|-----|-----------------------------|
| 100 | Start of RAM character set |
| 101 | INKEY check |
| 102 | Title |
| 103 | INPUT check |
| 104 | Used in entering characters |
| 105 | Value of input etc |
| 106 | Data for drawing input |
| 107 | For NEXT variables |

```

10 LET q=PEEK 23470+2348 PEEK
23470 LET q=q-80
30 POKE 23409,20
40 CLEAR q
50 LET q=PEEK 23730+2348 PEEK
23730 LET q=q-31
60 GO SUB 9000: GO SUB 9200
70 GO SUB 140: IF PEEK 23403
<> 1 THEN LET (B="1"): GO TO 320
80 GO TO 400
90 STOP
100 POKE 23404,0: POKE 23407,40
110 RETURN
120 LET r=q/256: POKE 23406,r-
127 r=r/256: POKE 23407,INT r-1
130 RETURN
240 REM HERE MENU HERE
400 BORDER 0: PAPER 7: INK 3: C
LR " GO SUB 100
410 PRINT BRIGHT 1: TAB(0) 1:
INK 1: TAB "1"CHARACTER CHANGE"
1: TAB 31: "1: TAB 0:18 (MSD Paul
Matthews): TAB 31: "
420 PRINT " TAB 14: INK 1:"MENU

```

```

430 PRINT " TAB 100: INK 3:"CHAR
ACTER HERE"
440 PRINT "18 Reset whole chara
cter set."18 View a ROM charact
er."18 View a ROM character."
450 PRINT "4 Change a character
"18 Reset just one character."
460 PRINT " INK 3: TAB 0:USER
DEFINABLE GRAPHICS"
470 PRINT "4 View a UDG."18 C
hange a UDG."
480 PRINT " INK 3:18 A Complete
view."18 LOAD/SAVE Resolutions."
490 INK 0: PRINT 0: BRIGHT 1:
INK 7: PAPER 0: TAB 0:Input you
r choice now.."1: TAB 31: "
500 LET (B= INKEY: IF (B) CH
R 49 OF (B) CHR 57 THEN GO TO
500
520 BEEP .1, CODE 16-44
530 IF (B="1" THEN LET a=USR
10-301: POKE 23401,1: GO TO 400
540 IF (B="2" OR (B="3" THEN B
0 SUB 100: GO TO 540

```

ALL CHANGE ALL

```

1000 GO SUB 140
1010 CLR : LET y=H"CHARACTER BE
T" AND I=I"1" : "USER DEFINABLE
GRAPHICS" AND I=I"2" OR I=I"3":
110 "A COMPLETE VIEW" AND I=I"4":
120 "LOAD/SAVE FOOTINGS" AND I=I"5"
130
140 PRINT INK 3: AT 0,15 : LET
y=20: I=I"
150 GO SUB 1: VVL I=I"GRAPHICS"
160 PRINT INK 3: INK 1: "Press ENTE
R for Menu, else same."
170 IF I=I"5" THEN GO TO
180
190 IF I=I"5" = CHR$(1) THEN
BRK .1,13: GO TO 100
200 GO TO 100
210 STOP
220 REM REDRAW A SCREEN
230 PLOT 128,128
240 INK 1: DRAW 64,0: DRAW 0,-6
250 DRAW 64,0: DRAW 0,64
260 INK 0: RETURN
270 REM REDRAW LARGE CHARACTERSS
280 LET x=0: LET y=0
290 INK 1: PRINT TAB 1;
300 LET x=INT I/20: PRINT CH
RS 144: IF x=1 THEN PRINT INK
x 0: " " : LET y=y+1
310 LET y=y/2: IF y=1 THEN INK
0: BRIGHT 0: RETURN
320 GO TO 100
330 REM UNLOCK AT CHARACTERSS
340 INPUT "View Which ROM Chara
cter? " : I=I: LET a=CODE a: IF a
<32 OR a>127 OR LEN a < 1 THE
N GO TO 1010
350 LET a=a-32: I=I+154
360 GO SUB 700
370 FOR f=1 TO 16: PRINT a; "
": NEXT f
380 PRINT " " : "Case"
390 FOR f=1 TO a/2: LET w=PEEK
f: PRINT "f=" : I=I+1: GO SUB 800:
NEXT f
400 PRINT "": FOR f=1 TO 16: PR
INT a; " ": NEXT f
410 RETURN
420 REM DRAW 1000 BUT IN RAMSS
430 INPUT "View Which RAM Chara

```

```

cter? " : I=I: LET a=CODE a: IF a
<32 OR a>127 OR LEN a < 1 THE
N GO TO 1010
440 LET a=a-32: I=I+154
450 GO TO 1000
460 REM REDRAW CHARACTERSS
470 INPUT "Character to be cha
ge..." : I=I
480 LET a=CODE a: IF a>127 OR
a<32 OR LEN a < 1 THEN GO TO 1
000
490 PLOT 128,128: GO SUB 700: L
ET a=a-32: I=I+154
500 FOR f=1 TO a/2: LET w=PEEK
f: PRINT "w=" : PRINT TAB 10: "
" AND f/2=INT I/20: I=I+1: GO SUB
800: NEXT f
510 PLOT 128,0: GO SUB 700
520 PRINT INK 3: "New Code" : "
" FOR f=1 TO 2
530 FOR f=1 TO 16: PR
INT CHR$(a) : " ": NEXT f
540 RETURN
550 REM RESET A CHARACTERSS
560 INPUT "Character to be rese
t..." : I=I
570 LET a=CODE a: IF a>127 OR
a<32 OR LEN a < 1 THEN GO TO 1
000
580 PLOT 128,128: GO SUB 700: L
ET a=a-32: I=I+154
590 FOR f=1 TO 2
600 FOR f=1 TO 2: PRINT "f: LET
w=PEEK f+1: IF f=0 OR f=2 TH
EN PRINT TAB 5: FOR g=1 TO 16
PRINT a; " ": NEXT g
610 GO SUB 800: NEXT f
620 IF b=1 THEN FOR g=0 TO 2:
POKE I+g,1: PEEK I+g: NEXT g:
PRINT AT 7,3: "WAS" : AT 10,0: P
LOT 128,0: GO SUB 700
630 NEXT b: PRINT AT 16,3: "NOW
f"
640 RETURN
650 REM UNLOCK AT USERSS
660 INPUT "USS to be viewed..."
670 LET a=CODE a: LET w=a/177
AND a>64 AND a<311+127 AND a/6
AND a<321: IF a<64 OR a>164 O
R LEN a < 1 THEN GO TO 1010
680 GO SUB 700: FOR f=1 TO 16:

```

all change CHANGE

ALL
CH
AN
GE

```

PRINT CHR$ 87 "!! NEXT 4
1820 PRINT "USER CODE!!"
1840 LET g=USR 48
1860 FOR f=0 TO 7: LET w=PEEK 1
1880 PRINT f+1; 80 SUB 800
1900 NEXT f: PRINT ""
1920 FOR f=1 TO 14: PRINT CHR$
a1 "!! NEXT 4
1940 RETURN
2000 REM EXCHANGE USERS
2020 INPUT "USG to be changed..":
1a1: LET a=CODE a1: LET a=a+(79
AND a/64 AND a/16)+147 AND a/64
AND a/128: IF a/144 OR a/255 T
HEN GO TO 2040
2060 LET a=USR a/11: PLOT 138,
132: 80 SUB 720: FOR f=0 TO 7
2080 LET w=PEEK 144+1: PRINT "a
1 TAB 10:" AND f/2=INT 11/2:1
CHR$ a1: 80 SUB 800: NEXT 4
2100 PRINT INK 21 "New USG Code
1":
2120 PLOT 138,131: 80 SUB 720
2140 FOR f=0 TO 7: INK 21 INPUT
w: IF w/8 OR w/255 OR w/2=INT
w THEN GO TO 2160
2180 POKe 144+1,w: PRINT "a1 TAB
10:" AND f/2=INT 11/2:1 CHR$
a1: 80 SUB 800: NEXT 4
2200 PRINT "!! FOR f=1 TO 14: PR
INT CHR$ a1 "!! NEXT 4
2220 RETURN
2240 REM **** COMPLETE VIEWERS
2260 PRINT "NON CHARACTER SET:":
2280 INK 0: FOR g=1 TO 2
2300 FOR a=1 TO 4: PRINT : FOR a
=0 TO 14: PRINT " " AND a/2=IN
T 14/2: AND f=0: CHR$ 164+130+f
+17:1a1 "!! NEXT 4: NEXT g
2320 PRINT TAB 10: FOR f=133 T
O 127: PRINT CHR$ f: "!! NEXT
4
2340 IF g=1 THEN INK 21 PRINT "
NON CHARACTER SET:": GO SUB 14
0
2370 NEXT g
2380 80 SUB 800
2390 INK 21 PRINT "USER DEFINAB
LE GRAPHICS:": FOR f=144 TO 144
2400 PRINT CHR$ a1 "!! CHR$ 23+
CHR$ 11+ CHR$ 0 AND f+157:1
2410 NEXT f
2430 RETURN
2440 REM **LOAD/SAVE ROUTINES**
2460 PRINT INK 12 "A..Save New
Character set.""B..Save User S
ettable Graphics.""C..Save Th
is Program."
2480 PRINT INK 21 "B..Load a C

```

```

haracter Set.""B..Load User S
ettable Graphics.""C..Load Any
Program."
2500 LET a=INKEYS: LET a=CODE
a AND a/16 AND a/128 AND a/64 AND a
/1024: IF a/144 OR a/255 THEN GO
TO 2480
2520 LET b=a/16 AND a/255+11a-48
1821: PRINT AT 8,0:1 INK 8: FLAG
B 1: OVER 1: TAB 7
2540 80 SUB 1300+11a-48+18100:1
2560 IF INKEYS="a" OR INKEYS
="B" THEN GO TO 2480
2580 RETURN
2600 SAVE "Char. Set" CODE q,7a5
2620 PRINT AT 20,10:VERIFY F 1
Y/50:1: LET a=INKEYS
2640 IF a="a" THEN GO TO 2660
2660 IF a="b" THEN GO TO 2680
2680 PRINT AT 20,2:1"Rawled Tape
and Press Play." AT 18,0: IF a
="b" THEN VERIFY " CODE
2700 IF a=a/7 THEN VERIFY "
2720 RETURN
2740 SAVE "U.S.B."a CODE 1q+7a5
7,1a4
2760 GO TO 2680
2780 LET a="y": SAVE "Character
." LINE 1
2800 GO TO 2680
2820 PRINT AT 18,1:1"Connect ear
plug & start tape."
2840 LOAD " CODE q
2860 RETURN
2880 PRINT AT 18,1:1"Connect ear
plug & start tape."
2900 LOAD " CODE 1q+7a5:1
2920 RETURN
2940 PRINT AT 18,12:1 FLASH 11'S
YE 878."
2960 PRINT 81:1"Press any key & t
hen start tape."
2980 LOAD "": SUM
a/999 STOP
3000 REM **SET UP LOG**
3010 RESTORE 9000: FOR f=0 TO 7:
READ a: POKe USR "a"+f,a
3020 NEXT f: RETURN
3030 DATA 128,125,125,125,125,12
5,125,125
3040 RESTORE 7000: LET f=q/254
3060 FOR f=q-30: TO 1q-30+11:1
READ a: POKe f,a: NEXT f: RETURN
3070 DATA 17,1r=INT f+1288, INT
f,33,0,41,1,0,7,237,174,201
3080 STOP
3090 80 SUB 100: POKe 23428,0

```

The 1K Corral

1K wonders to amuse
and confuse!

We continue with our policy of providing something for everyone with the selection of 1K programs. Although many are intended to amuse and entertain, some are useful and even educational. These programs show what can be achieved in 1K using BASIC.

For the programmer with spare RAM at his disposal they provide starter programs for development and they are good for the beginner as well, usually involving efficient, tight programming in order to build in fit.

Teletext D Wishart

This is a routine which is intended to be incorporated into a larger program, but it will run on its own. It gives a printed output similar to that of a teletext printer and can be used to automate instructions or information. The amount of memory used depends on the length of the text, but for a rough guide, the printed program will just fit into 1K without the REM statements.

The principle it works on is quite simple. It prints out the characters of the string 24 one by one, unless the character is a

dollar sign, in which case the screen is SCROLLED twice, and a new line is started. When typing in your own text, you must remember to finish each line with a dollar sign or the program will terminate with error code 5.

You can terminate the string and change the character which ends the line. If performing the latter, you must change the 12 in line 20 to the code of the new character.

Unfortunately, after SCROLLing the screen it takes a long time to clear, so it is advisable to go into fast before executing a CLR. Note that after the word "enter" in line 5, there are two spaces.

```

1 REM TELETXT
5 LET Z$=""          TELETE
10 FOR I=1 TO LEN Z$
15 FOR J=1 TO LEN Z$
20 IF CODE Z$(I)-12 THEN GOTO 50
25 PRINT Z$(I);
30 NEXT J
35 IFOP
50 SCROLL
55 SCROLL
60 NEXT I
70 REM BY B. WISHART

```

Air strike Barry Curtis

Scramble, scramble, you are in the crucial position of plotting your missile into the helicopter.

Black squares. Using aim control keys 6 to go down and 7 to go up you have one minute in which to succeed. Good luck, Boggles!

```

30 LET A=0
35 LET B=10
38 LET C=A
40 LET D=B
50 LET E=A
55 LET F=100
60 CLR
70 IF A=30 THEN LET A=0
80 IF B=21 THEN LET B=0
85 IF C=21 THEN LET C=0
90 PRINT AT B,A;"0000"
100 PRINT AT C,D;"B"
110 IF C=15 OR D=15 AND 5 THEN GOTO 140
120
125 PAUSE 20
130 LET E=E+1
135 PRINT "HOT SCORE=";E
140 LET C=C+1
145 LET D=D+2
150 LET A=A+1
160 IF E=0 THEN PRINT "YOU HAVE RUN OUT OF""TIME SCORE=";E
170 IF E=0 THEN STOP
180 LET B=B-(10*E+2)*.1*(10*E+2)
190 GOTO 40

```

Homeward bound C Rigby

A very basic but pleasingly different game in which the object is to guide the multiposition sign (B) left and right until it travels to the screen so that it arrives home on the addition sign (+).

The "B" moves up the screen automatically and you use keys 2 and 4 to guide it left and right. The "+" is positioned

randomly at the top of the screen and the "B" is positioned at the bottom and starts moving immediately.

If you manage to reach the "+" then a message is displayed and your score increased. No further press any key. If you fail then your score is displayed and you will have to re-run the program for another game.



HOME SWEET HOME

```

1 LET C=0
2 LET B=30
3 CLR
4 LET A=INT (RND*200)
5 LET B=INT (RND*200)
6 PRINT AT 1,B;"*"
7 PRINT AT B,A;"*"
8 LET B=B-1
9 LET A=A+(INKEY="H")-(INKEY
=>"J")
10 IF B=1 AND A=B THEN GOTO 13
11 IF B=1 THEN GOTO 17
12 GOTO 7
13 LET C=C+1
14 PRINT "MISSION ACHIEVED"
15 PAUSE 184
16 GOTO 2
17 PRINT "SCORE:";C
18 STOP

```

```

1 SAVE "P"
2 LET A=1
3 LET B=0
4 LET C=2
5 LET B=3A
6 LET C=3
7 LET J=0
10 PRINT " ABCDEFH"
20 FOR J=A TO B STEP 5
40 PRINT AT J,A;"*"
70 NEXT J
80 FOR J=A TO B STEP 5
90 PRINT AT J+A,A;J;"*"
100 NEXT J
105 PRINT AT A,B;"*"
110 GOTO 170
120 PRINT AT F,G;"*"
130 GOTO 170
140 PRINT AT F,G;"*"
150 GOTO 170
170 INPUT AB
180 LET F=VAL AB*10
190 LET B=ODD AB*10
200 LET H=VAL AB*10
210 LET K=ODD AB*10
220 RETURN

```

Union Jack D Ibrahim

This nifty little program displays a simple graphic representation of the Union Jack, a patriotic program which uses the PLOT function efficiently.

I know that we have a lot of readers throughout the world and it would be nice if we were sent a selection of flag programs (not a star machine) — you could then make your own "Flag of the world" collection.



```

1 REM UNION JACK
3 FOR I=3 TO 40
5 PLOT I,40
7 PLOT I,43-1
10 PLOT I,1
11 PLOT I,22
25 PLOT I,1
30 PLOT 40,I
32 PLOT 32,I
33 PLOT I,1
35 NEXT I
38 PRINT AT 3,38;"ODD",AT 7,38
;"EVEN",AT 13,38;"TH",AT 17,38;"
SQU",
40 PAUSE 180
45 CLR
50 GO TO 3

```

Fox and hounds David Clover

A two player game in which one player is the fox (X) and the other the hounds (H). The hounds start and move by entering the position of the piece to be moved and the position to which you wish to move. The is entered as a four character input eg 1A2B will move the piece on square 1A to square 2B. Each player gets ten moves only per turn, and moves should be on the white squares.

The aim of the game is to be the first player to reach the opposite side of the board. Jumping is not allowed and the fox may move back or forward whilst the hounds can only move forward. All the four



hounds must be at the edge of the board for their turn.

Tactical hint: If you are the hounds, try and keep in an unbroken line so forcing the fox to retreat until all your hounds can reach the side of the board. If you are the fox, try and force the hounds to leave a space where you can slip through.



Apple catcher A Murray

Apples are abundant this year! You don't have to pick them, just catch them as they fall from the trees. However, life is never that simple and every now and then a cunningly laid barrel passes your way over which you will have to jump.

See 1 moves how to play and key. Actress right, background key.

P. The best way to jump is to hold P down until the barrel passes (should you find yourself suspended in mid air press P once more to descend). You can not catch apples while jumping.

You score one point for each apple caught and the game ends when you miss three apples or you are hit by a barrel. Who said "an apple a day"?



```
2 LET S=0:PI=1
5 LET S=PI-PI
7 LET S=0
10 LET A=CODE "3"
15 LET S=VAL "10"
20 LET C=0
25 LET S=S+1
```

```
30 LET X=INT (RND*8)+3
40 PRINT AT A,B:CHRN 13:CHRN
PIAT A+1,B:CHRN 13:PIAT A+2,B:CHRN
5 130
50 PRINT AT C,M:GO
60 PRINT AT 20,D:CHRN 13
70 LET S=S-1
80 LET C=C+1
90 LET S=S+(INKEY$="A")-(INKEY$="B")
100 IF C=CODE "4" THEN LET C=0
+1
110 IF C=CODE "4" THEN GO TO 1
0
120 IF S=1 THEN GO TO 300
130 IF A=10 AND S=0+1 THEN GO
TO 300
140 IF INKEY$="P" THEN LET A=A+
+1
150 IF A=16 THEN LET A=10
160 IF C=17 AND A=17 AND S=0+
1 THEN LET S=S-1
170 IF C=18 AND A=18 AND S=0+
1 THEN GO TO 10
180 CLS
190 GO TO 40
200 PRINT AT 10,20:"SCORE="+S
```

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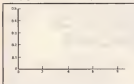
Graph it!

**A valuable program to impress your teacher
from Paul Bates of Walsall.**

This program will plot graphs from given information in one of several styles and can be saved without reentering the data in each of the plotting modes. It is Menu-driven and simplicity itself to use. Graphs can be used to display results from any type of data gathering exercise.

The program itself occupies about 8K, and is entirely in BASIC. The Menu has six options:

- 1) Enter data
- 2) Choose dot character
- 3) Choose plot type
- 4) Draw graph
- 5) Regression analysis
- 6) Quit program



OPTION 1: On entering the option you will first be asked to enter the number of data pairs. The data pairs are then entered with the screen displaying the data pair to be entered next. After data entry you will be asked to go on.

- 1) A graph title (Maximums)
- 2) An X axis title (10)
- 3) A Y axis title (character)

You will then be asked for data to define the axes (this could have been done automatically using a suitable sort of data, but I prefer to define my own values to give a neat report). Enter X min, X max, Y min, Y max as prompted. The screen

will then be cleared and you will be asked to define the X and Y data intervals. For example:
X data ranges from 1 to 5
Y data ranges from 0 to 10

Xmin=0 Xmax=5
X to mark=2 Ymin=0 Ymax=10
Y to mark=0.1

Because of setting too small a value for Y to mark, intervals eg 0.5 for X axis — the result isn't the X axis looking rather crowded. After data entry you will be offered a print out of the data pairs entered:

OPTION 2: Refuses a table giving linear regression equations. This gives the equation of a straight line which best fits the data points entered. (This works over all the data pairs entered.) The regression coefficient r indicates the goodness of fit.

$r=0$ data does not follow a

linear relationship
 $r=1$ perfectly fits equation determined

r values above 0.7 can be said to be a good indication of linear behaviour.

OPTION 3: Escapes from program giving a STOP report.

A few words...

Here's a breakdown of some of the more important bits in the program:

20 140
1000 1800
2000 2140
3000 3080
4000 4040
4040 4320
4320 4420
4420 4520
4700 4750
4800 4870
5000 5200

Setup Menu
Enter data option
Character option
Plot option
Draws axes
Plots the marks and coordinates axes
Plots Y axis title vertically
Plots points
Plots lines
Rounds to plot points by straight lines
Bates-H easy format
Linear regression

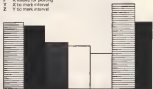
Variables

The often variables used are:

- A Menu option
- B Number of data points
- C X min
- D X max
- E Y min
- F Y max
- G Dot character value
- H Plot style
- I Y values for plotting
- J X values for plotting
- K to mark interval
- L Y to mark interval

- A4 Graph title
- B4 X axis title
- C4 Y axis title
- D4 Copy of data?
- E4 Copy of graph?

S01 X value Data pair
Y01 Y value



```

10 BORDER 3: PAPER 6: INK 1: C
15
11 PONE 93330.0
20 PRINT AT 1.3: "-----"
30 INPUT G
40 PRINT AT 3.5: "1-ENTER DATA"
50 PRINT AT 7.5: "2-CHOOSE DOT CHARACTER"
60 PRINT AT 9.2: "3-CHOOSE PLOT TYPE"
70 PRINT AT 11.5: "4-DRAW GRAPH"
80 PRINT AT 13.5: "5-REGRESSION ANALYSIS"
90 PRINT AT 15.2: "6-BUIT PAPER"
100 PRINT AT 18.1: "ENTER OPTION"
110 RETURN TO MENU
120 INPUT I
130 IF I=1 THEN GO TO 110
140 IF I=2 THEN STOP
150 LET A=UAL I
160 G
170 IF I=3 THEN GO TO 10
180 GO TO A+1000
1900 BORDER 3: PAPER 1: INK 7: C
1910
1910 DIM A(50): DIM X(50): DIM Y
1920 DIM A(10): DIM A(10): DIM
1930 DIM A(10): DIM A(10): DIM
1940 PRINT AT 1.5: "-----"
1950 LET G=0 LET H=0
1960 PRINT AT 3.5: "NO. OF DATA PA
1970
1980 G=0: A=0: INPUT G
1990 IF G=0 THEN GO TO 1990
2000 PRINT AT 3.5: G
2010 FOR I=1 TO G
2020 PRINT AT 5.5: "X": I: "-"
2030 INPUT X(I)
2040 PRINT AT 6.5: X(I)
2050 G=0: A=0
2060 PRINT AT 8.5: "Y": I: "-"
2070 INPUT Y(I)
2080 PRINT AT 10.5: Y(I)
2090 G=0: A=0
2100 PRINT AT 12.5: "PRINT
2110 AT 10.5:
2120 NEXT I
2130
2140 BORDER 4: PAPER 6: INK 2: C
2150
2160 REM CHARACTER LETTER 13 G
2170 PRINT AT 1.5: "-----"
2180 LET G=0
2190 PRINT AT 4.5: "OPTION 1: "
2200 PRINT AT 5.5: "OPTION 2: "
2210 PRINT AT 6.5: "OPTION 3: "
2220 PRINT AT 13.1: "INVERSE 1: "
2230 LET I=1: "ENTER YOUR CHOICE (1,2,3,4,5)"
2240 INPUT G
2250 IF G=1 THEN LET G=40
2260 IF G=2 THEN LET G=40
2270 IF G=3 THEN LET G=40
2280 IF G=4 THEN LET G=40
2290 PRINT AT 15.5: "YOUR CHOICE
2300
2310 PRINT AT 18.15: CHR$ 8
2320 G=0: A=0
2330 GO TO 10
2340 BORDER 5: PAPER 7: INK 3: C
2350
2360 PRINT AT 1.5: "-----"
2370 LET H=0
2380 PRINT AT 3.5: "OPTION 1: POI
2390 NTS ONLY"
2400 PRINT AT 10.5: "OPTION 2: PO
2410 INTS JOINED BY"
2420 PRINT AT 11.15: "STRAIGHT LI
2430

```

SPECTRUM PROGRAM

```

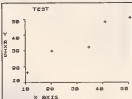
3000 PRINT AT 10.4, INVERSE 1, P
3001 IF 1=ENTER YOUR CHOICE
3002 INPUT H
3003 IF H=1 OR H=9 THEN GO TO 30
3004 GO TO 10
3005 IF G=0 THEN LET G=45
3006 IF H=0 THEN LET H=1
3007 BORDER 5: PAPER 7: INK 0, C
3008
3009 LET I=40 LET J=30
3010 PLOT I,J: ORAM 0,100
3011 PLOT I,J: ORAM 200,0
3012 LET K=17
3013 PLOT I,J: ORAM -3,0
3014 LET L=17-0.5*I
3015 FOR H=1 TO L
3016 LET J=J-INT(100/L)
3017 PLOT I,J: ORAM -3,0
3018 NEXT H
3019 IF P=0 THEN LET L=(P-0.5)/2
3020 IF P=0 THEN LET L=(10-P)/2.5-1
3021 LET G=0
3022 FOR I=1 TO L+1
3023 PRINT AT 0.0,
3024 LET G=10+2*I
3025 LET H=10-17*(L+1)/L+13.11
3026 NEXT I
3027 LET J=40 LET J=30
3028 LET L0=(10-0.5)*J
3029 PLOT I,J: ORAM 0,-3
3030 FOR H=1 TO L0
3031 LET I=I-INT(100/L0)
3032 PLOT I,J: ORAM 0,-3
3033 NEXT H
3034 IF C=0 THEN LET L0=10-0.5*J/Y
3035 IF C=0 THEN LET L0=(10-0.5)/Y+1-1
3036 LET K0=0 LET M=0
3037 FOR H=1 TO L0+1
3038 PRINT AT 10.0,0
3039 LET M=M+Y
3040 LET K0=INT K0+(10/(L0+1))
3041 NEXT H
3042 PRINT AT 21.0,0
3043 PRINT AT 0.0,0
3044 REM Y AXIS TITLE
3045 LET M=0
3046 FOR I=1 TO 10
3047 PRINT AT H.0,C0(I)
3048 LET H=H+1
3049 NEXT I
3050 LET H=0 LET M=M+0
3051 LET M0=0 LET M0=M+0
3052 REM PLOT POINTS
3053 LET P0=0 LET Q0=40
3054 FOR I=1 TO 5
3055 LET M0=10*(10-M)/(10-M0)
3056 LET Q=INT(10*(20+2))
3057 LET P=I*(10-M0)/(10-M0)+10
3058 LET P=INT(10*(10-M0)+1)
3059 PRINT AT 0.0,0
3060 IF H=0 THEN GO TO 4700
3061 NEXT H
3062 GO TO 4000
3063 LET J=0
3064 LET P1=INT(10*(P/10)-1)+170
3065 LET Q1=10*(10-M0)
3066 PLOT 0,0,P0
3067 ORAM 101-001,101-P0
3068 LET P0=P1 LET Q0=Q1
3069 LET J=10+1: IF J=0 THEN G
3070 GO TO 4000
3071 GO TO 4010 INPUT "COPY(Y/N)"
3072
3073 IF H="N" THEN GO TO 10
3074 IF H="Y" THEN COPY
3075 GO TO 10
3076 BORDER 5: PAPER 4, INK 0, C
3077
3078 PRINT AT 1.0, "TEST NAME IS"
3079 PRINT AT 4.0, "TEST NAME IS"

```

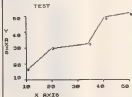
```

3080 LET Q0=0 LET Q0=0 LET P0=0
3081 FOR I=1 TO 5
3082 LET Q0=Q0+K1(I)
3083 LET P0=P0+V1(I)
3084 LET Q0=Q0+V1(I)
3085 LET Q0=Q0+V1(I)
3086 LET Q0=Q0+V1(I)
3087 NEXT I
3088 LET Q0=Q0/(100+Q0)/0
3089 LET Q0=Q0/(100+Q0)/0
3090 LET Q0=Q0/(100+Q0)/0
3091 LET Q0=Q0/(100+Q0)/0
3092 LET Q0=Q0/(100+Q0)/0
3093 LET Q0=Q0/(100+Q0)/0
3094 LET Q0=Q0/(100+Q0)/0
3095 PRINT AT 0.0, "THE SLOPE IS"
3096 PRINT AT 0.0, "THE INTERCEPT"
3097 PRINT AT 10.0, "HENCE THE EQ"
3098 PRINT AT 10.0, "Y=", Q0, "+ X"
3099 PRINT AT 14.1, "THE CORRELAT"
3100 CORP=0.9999999999
3101 PRINT AT 10.0, "CORRELATION"
3102
3103 DIM J0(10) INPUT J0
3104 IF J0=0 THEN COPY
3105 IF J0=0 THEN COPY
3106 GO TO 10

```



What all you plotting should result



The Petron Trichord — a sound choice?

Colin Christmas has a close encounter of the noisy kind with this ZX81/Spectrum unit.



Petron Electronics have produced a music and sound generator for use with the ZX81 and the Spectrum. The Trichord can be bought with or without a built-in amplifier and speaker and plugs straight into the edge connector or port at the rear of the computer. The basic unit will drive most audio amplifiers, but for playing music it's best if linked up with a stereo HiFi amplifier. A short lead and connector plug are supplied for the purpose and a programming manual and software cassette also come as part of the package. Four programs are provided on the cassette — "S" for the Trichord's main programmed sound effects, "D" and "Q" for producing and utilising user-defined effects and on the other side of the tape, the Music Program, "M". A demonstration cassette with sound effects and music produced by the Trichord is also available.

If you use the unit with the ZX81, then a 128K RAM pack is necessary to give the music its bite, so you will only be able to use the pre-programmed sound effects in the Trichord's

memory. One initial criticism is that as the RAM pack plugs in to another edge connector at the rear of the Trichord, the odd nightmare of cabling programs caused by the Wobblers is back with a vengeance. Users who don't spend time, money or ingenuity getting the three ports firmly fixed up and "locked down" will find themselves close to tears on more than one occasion in the early stages of getting to know the Trichord. As only the most arduous and more seriously-minded musician is likely to be interested in the Trichord, it can meet unnecessary frustration and time wasting.

The little black box

The pre-programmed PROM inside the Trichord contains the data for many sound effects

The next step may be to add any of the sounds you have now heard to one of your own programs — no problems here either. Load "D" and without altering line 1 of the program, start to type in your program. Two lines (quite far) later by the time together with the number of the effect you want (see manual) are inserted with one number every time a sound effect is required. Suddenly you enter a new dimension, don't you? The end of a simple game has a comic air all finally when accompanied with a rather of machine gun fire. All that is needed to get the most out of this program is a little imagination — the time taken to expand programs to the new dimension is well spent.

Clever stuff

But even that's hardly getting one's money's worth and of course the Trichord is designed to go a lot further. Programs "D" and "Q" on the software cassette enables the an aggressive, inventive and simply curious user to derive and then use their own sound effects. "S" is used, with the manual, to explain how the Trichord's sounds are generated. It's fairly technical stuff and surely needs intended for more advanced music-users who are used to converting from binary code to decimal while bashing their teeth in the machine!

However, unless you are one such a person and therefore already know how internal envelope generators work in units like the Trichord, then it is important to work through the section and the program — it only because you need to know how the 14 registers in the PROM affect the production of sounds if you are going to derive your own effects. That surely is one of the reasons for buying the Trichord in the first place.

Having produced sounds guaranteed to annoy the

Program "S" enables you to use the POKE instruction and use USB instruction both clearly laid out in the manual to select a huge variety of "bells", "bongs", "pings", "bumps", "crashes", "chuks", "whistles", "shatters", "flat tans", "flashes", "boots", "vapors" and so on. In fact, the POKE instruction selects the sound to be generated and the USB instruction triggers the sound. The manual gives a general guide to the range and variation possible over the 256 as an numerical sounds. It's both intriguing and entertaining just to sit down with this program and find out its innermost what is already contained in the "little black box". Thus far, no programming skills at all are needed — so far, so good. But there's more, a LOT more.

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The soft touch

James Walsh gives us the low down on some of the latest software releases for the Spectrum.

3D Monster Chase — Romik Software

The idea of 3D Monster Chase is not to chase a monster, as the name rather implies, but to collect seven keys which are hidden in a three level maze. Unfortunately there are complex levels, but you have to be found first, you then return to base. Once you have made it back, a bomb is triggered. If you do not find the bomb before it explodes, a lightning bolt strikes the bomb, found in time, it must be taken back to the start. Here the sequence starts all over again but this time both keys one and two must be found, and in that order only.

Just to make it that bit more difficult, as if it rains it, at least one monster is always flying in following you. Obviously this is a little bit late and your loss.

All this goes on in a 3D maze, and although the monsters themselves do get bigger as they approach, they are still flat. There are five levels of play, even on the lowest level I have yet to find the second key. At the top of the screen is a radar, showing your position and those of the monsters and you have a small supply of grenades which are used to destroy monsters at the correct range.

Verdict: The game is fast though inherently jerky due to the nature of the maze. Finding the keys is no easy matter, as above, observing of the bomb. Killing monsters is a matter of luck to start with as you are told that the grenades work at the correct range, but what is the correct range? The chance of finishing the game, even on level one, is completely small. Personally, I feel the game should have been made a little easier on level one so as to stop the novice going up in flames. On the whole I feel that 3D Monster Chase is a

good game, but not particularly original.

| | |
|-----------------|-----|
| Learning appeal | 70% |
| Graphics | 80% |
| Originality | 90% |
| Playability | 90% |
| Use of machine | 90% |
| Value | 70% |

Star Warriors — Visions

For some strange reason you are sitting in space with various coloured aliens moving towards you (and in the corner). The rest of the part of the game is to kill off all these alien ships without you yourself being hit by one of them. There are bombs. Once these are used you are killed, you are respawed at the top of the screen and you slowly start to defl-

downward through a meter above. Unfortunately, it is impossible to blow up the meters, rather, it is necessary to avoid them.

Once you have guided your ship to the bottom of the screen, you find yourself on the outside of a small 2D maze. A little man (you presumably) jumps out of your ship and has to find his way to the other side to where a control lies and then back out again. Progress is hindered by a sort of alien blob, which seems to shoot you, though he is unharmed. In fact, the pet flower alien can make life very difficult, simply by sitting next to the entrance to the maze. As soon as you make it back to your ship the game restarts, but with different shapes and more fantastic alien beings.

Verdict: Action is reasonably fast and smooth but not again the game is rather repetitive. The three different basic concepts do make the game more fun than the straight 'Space Invaders' type shooter. From when the first stage is taken, the graphics themselves are quite good but nothing at all like the quality by today's standards. One least I did notice above some of the faster games is that it is a little five and ten in play and that counts for quite a lot.

| | |
|-----------------|-----|
| Learning appeal | 70% |
| Graphics | 70% |
| Originality | 70% |
| Playability | 80% |
| Use of machine | 70% |
| Value | 70% |

Starclash — Micromega

Apparently, you have been displaced in space by your boss, whilst last flying a new spaceship. Confronted by an Imperial Strike Force, the game is a mixture of top running the enemy, all that can be done is to stand and fight until your shield is obliterated. The enemy is a sort of... The Imperial membership is protected by fast types of defence fighter. These must also be destroyed before it is possible to attack the mothership itself. To make it more difficult you are only supplied with three shields and a limited amount of laserbolt energy.

Verdict: Little can be said about Starclash, except that it is only one a step up from Space Invaders. Unfortunately the game is additive but hardly original. Action is too slow to start, the way the shields (laser) gradually disappear. Action is reasonably smooth, the graphics are quite good and the sound is about as good as can be expected from the Spectrum. Fairly poor.

| | |
|-----------------|-----|
| Learning appeal | 70% |
| Graphics | 70% |
| Originality | 70% |
| Playability | 70% |
| Use of machine | 80% |
| Value | 80% |

Shark Attack — Romik Software

The idea of this game is to sit



TO BE A REAL ACTION SHOT OF THE GAME
WILL YOU BE THE SUPREME WORLD CHAMPION?



neutralize the octopus or octopods with what are to be proven them from the sharks, which at the same time filling the screen with your net. Each time the required amount of the screen has been filled, the higher level will be selected. As might be expected, every net often can shoot, usually by one in particular. Besides, to lead the way through the netting, which does rather undermine the point of the game. Lives are lost from an octopus kills of three, either by shooting with a shark or an octopus. This is as far as the game goes, there is nothing left to add except that it is a success.

Verdict: Simple though it is, the game is fun and exciting and the unadorned concept is ideal for city life. Unfortunately, its simplicity could be a disadvantage in its result as it may become boring rather rapidly.

| | |
|-----------------|-----|
| Learning appeal | 80% |
| Graphics | 80% |
| Originality | 80% |
| Playability | 80% |
| Use of machine | 80% |
| Value | 70% |

Jumbi — DE Tronics

Jumbi is based on the old fashioned snake puzzle game in which a sequence of numbers, letters or a picture must be arranged correctly. In this rather advanced computerized ver-

sion, a number of specially designed pictures are divided into twenty blocks. The computer jumbles the picture by removing a block and sliding the remaining pictures about in a random manner. The odd block is then replaced since the picture has been completed. Now they must rearrange the blocks into the correct order using keyboard or joystick.

A large number of moves for each picture is provided. If this target is exceeded, the picture will have to be attempted again if on the other hand the target is either met or beaten then the option of going on to the next puzzle is provided. Times are given in each puzzle, the next one only being given on the completion of the present one. For survival, the first three times are given before hand, so giving you a headstart.

Some pictures jumble with wrap-around, a block can wrap off the end of the puzzle board and reappear on the other side as sliding another dimension to the game. Another added extra is the cleverly written type which plays with each puzzle label can of course be turned off. If and when you complete all the puzzles, there are opportunities to win a 160 by designing your own picture.

Verdict: The pictures are pleasing, the graphics are excellent and the sound is fantastic. An old idea has been put to work very neatly and efficiently whilst also expanding

upon it. The game is surprisingly addictive and often frustrating. The graphics are smooth and a pleasure to watch and the game is a delight from a player's point of view as well as the programmer's.

| | |
|-----------------|-----|
| Learning/appeal | 80% |
| Graphics | 80% |
| Originality | 70% |
| Playability | 80% |
| Use of machine | 70% |
| Value | 80% |

Computaword Vol 1 — Work Force

Computaword Vol 1 is a digest of ten crosswords to be solved with the aid of a number of rather advanced functions provided by the computer. To start with a grid is shown and each clue can then be attempted. It may display all up or all down clues or just one clue at the bottom of the screen.

As you battle your way through the puzzles get harder and harder. The first couple are reasonably easy, whilst the latter ones are more of the Eternity variety. Each attempted solution may be checked without going away the screen but each puzzle may be simply set up or copied to print. The signal to give up will cause the display of grid plus all the answers.

Verdict: Computaword has

been reasonably well put together, utilizing a number of ways in which a computer can improve upon the basic crossword puzzle. Unfortunately, I feel rather more could have been done to put it out to a real challenger to the orthodox crossword puzzle. The program does its job in producing a computer crossword puzzle but a lot of potential has been left unexploited. All things considered though, it is still worth thinking about.

| | |
|-----------------|-----|
| Learning appeal | 70% |
| Graphics | 80% |
| Originality | 80% |
| Playability | 80% |
| Use of machine | 80% |
| Value | 80% |

Expados — Visions

Expados is the Centipede Revenge, a copy of the age old arcade game, Centipede. The scenario is as follows: a centipede is moving across the screen towards to the other game playing station in you all the time. The screen is scattered with mushroom type objects through which the centipede cannot go. It will have to make a stop along its way instead. These mushrooms can be shot and are destroyed by your laser if required.

The aim of the game is to shoot every segment of the centipede. As a segment is destroyed, a new and more vicious one will appear. The scenario is good, screen by the success of the arcade version, but is it not rather old dated?

Verdict: The graphics are nice but every movement is so carefully slow, if any other is faster, appears to be a waste. Hence, it is so slow and predictable that it is hardly worth worrying about. The explosions are a little better and in some cases the screen. An old theme has been copied poorly with obvious programming effort with nothing to highlight a less than brilliant game. The potential is there as we have seen from Artic's version of Centipede, a version which is fast, furious and very exciting whilst a shame this one is not.

| | |
|-----------------|-----|
| Learning/appeal | 80% |
| Graphics | 80% |
| Originality | 40% |
| Playability | 80% |
| Use of machine | 80% |
| Value | 80% |





Wild west hero — Timescape

A wild west hero looks at course must destroy gangster camp of criminals nasty bandits, whilst avoiding the goring cacti or any other objects, and most importantly stay alive!

At the start of the game, the hero is given three lives with which to carry out his task. Armed with an automatic he must accumulate the highest score possible (surprise, surprise). For the first 20,000 points scored, a bonus life is awarded and for every 10,000 points after that, it is provided with one or two people (or alien) support and a computerised character. There are only four controls — up, down, left and right. Firing is done by moving in the desired direction.

Verdict: Wild West Hero is definitely fast and fun, at times rather too fast and not a game for the faint hearted. The graphics are fast and reasonably smooth. The only main criticism of the game itself is the lack of further scenes or adventures. Apart from that, it is thoroughly enjoyable. It isn't 100% original and very good value indeed. An excellent publicity-type game.

Loading speed 80%
Graphics 70%
Originality 50%
Playability 80%
Use of machine 70%
Value 80%

Dimension Destructors — Artic

Dimension Destructors was written by the author of Tank Battle, a 3D Tanks game, which rather suffered from a severe lack of speed. These 3D techniques have been harnessed in a more adventurous project in Dimension Destructors. Apparently, you are in the lonely but peaceful reaches of the vast unexplored regions of outer space. Suddenly a dot appears on the starless screen of your flight path. As you thrust forward the dot grows until it is a 3D space craft. With weapons to run and some unexpected reason for believing that the computer wishes to destroy you, you can either choose to shoot or attempt to hit it with your laser. These alien ships are reasonably tame — they only try to collide with you head-on. As time goes on more vicious

aliens which actually fire at you join in the fight.

Dimension Destructors is compared with Asterix, Kangaroo and Fuller (space) which is a definite bonus as a joystick greatly enhances the game. Why it is called Dimension Destructors I do not know — where are you destroying time or any other dimension? Nonetheless in the instructions/story does it say why the aliens want to exterminate you. Aliens do seem to get a very rough deal as far as computer games are concerned. If we are not careful, computers will start an ALP. After liberation from such govt control, all those poor alien menaces out of space invaders will be freed!

Verdict: The 3D graphics are some of the best I've seen bar those of Rumble Revenge and CDS' new Tank Battle game. They are fast and reasonably smooth and the whole game is definitely hectic. Though easy to play at the outset it gets harder and harder as you really commence. The design of the game is simple and slightly crude but it is one of the best games I've played. It is excellent. Dimension Destructors is highly addictive — a game which must be played "just one more time" and very good value.

Loading speed 80%
Graphics 80%
Originality 70%
Playability 80%
Use of machine 80%
Value 80%

Further information on any of the games reviewed in this article can be obtained from the following addresses:

Amtek Software Ltd, 277 Regent Avenue, Salford, Merseyside

Mixxon Software Factory Ltd, 7 Padgate House, 25-26nd Street, London W8 3JF

Megabyte, 230-236 Levenshale Rd, London SW11 1LJ

De'Tronics, Sheff Hall Industrial Estate, Salford Western, Essex CB11 3AX

West Games, 140 Wilton Avenue, Luton, Beds

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**A ZX81 game
that is just
out of this
world from
Andrew
Turner
in Hull.**

Although this game is nearly a full 16K and a lot of testing is needed, it will provide many hours of play due to the use of random factors.

You have been transported to Mars by the mysterious Professor and have to find and kill the ubiquitous dragon who inhabits the planet. Unfortunately he is guarded by a fascist character who cannot be killed — your only chance is to collect lots of gold (5000) with which to bribe him to let you pass.

Once you have destroyed the dragon then you only have to find your way back to the entrance on level 273 to win Easy? There are three levels each consisting of 28 caves in a total of 84 locations. On level one you can find a magic ring that will make you inviolate which is a great help because you'll certainly need it.

Such old favourites as Barrels, Goblets, Serpents and Trills have to be dealt with, not forgetting the Martians



```

5 REM "MCM"
7 LET ARM=0
8 LET RING=0
9 LET LEV=1
10 LET GOLD=0
11 LET N=1
12 LET Y=1
13 GOSUB 1100
14 SLOW
15 PRINT AT 0,0;"*****
***** THE MA
RTIAN AFFAIR *****"
*****"
20 PRINT AT 10,0;"DO YOU WANT
THE STORY (Y OR N)?"
  
```

Martian offair

Themselves: Contents of the caves on each level are reset by the sphinxes as you change level. It prevents Mummies that caused by the JCR to remove themselves.

When you start the game you will probably roll up side by side immediately as the cave you have been transported to may contain something.

A note of warning

To help you play the game, full instructions are included in the listing but this listing was reproduced on a Sinclair screen and graphics characters have been replaced by a simple code. This replaces all a number in

number means only one character) which is the number of characters needed, followed by "g" to indicate graphics mode and finally a letter or number which is the key of the character. The code "v" means (source: <http://www.ibm.com>)

These cycles are compared with a ^{238}Pu generator model using the code "Zr + Pu".

means two inverse spaces and two characters selected by graphics mode switches A. Lower case messages are to all text in normal mode.

I hope you will find this more or less what I know it at least that simple but I think that you will agree with me that it makes the rest of the program easier to read. Now also we



```

20 IF THREE="Y" THEN GO20 70
60
40 IF THREE="N" THEN GO20 300
50 GO20 30
200 LET X=1
310 LET Y=1
220 LET LEY=1
230 LET Z=(X+Y)+2
240 LET A=(Y+Z)-2
245 GO20 7000
250 PRINT AT G,1,"A"
260 FOR M=1 TO 30
270 NEXT M
410 IF L1,Y,Y=1 THEN GO20 2000
420 IF L1,X,Y=2 THEN GO20 2500

```

```

430 IF L(X,Y)=3 THEN GO50 3500
440 IF L(X,Y)=4 THEN GO50 3500
450 IF L(X,Y)=5 THEN GO50 4000
460 IF L(X,Y)=6 THEN GO50 4500
470 IF L(X,Y)=7 THEN GO50 5000
480 IF L(X,Y)=8 THEN GO70 5300
490 IF L(X,Y)=9 THEN GO50 5500
500 GO500 7000
510 IF INKEY="5" THEN GO70 600
520 IF INKEY="4" THEN GO70 430
530 IF INKEY="2" THEN GO70 420
540 IF INKEY="8" THEN GO70 430

```

```

740 IF DMOBYE="Y" THEN GOTO 440
0
750 IF DMOBYE="N" THEN GOTO 400
0
760 GOTO 700
2000 FOR N=1 TO 20
2010 NEXT N
2011 LET S(X,Y)=0
2020 GLE
2025 LET GOLD=GOLD+1000
2030 PRINT AT 0,0;"*****
*****"
GOLD *****
*****"
2040 PRINT
2050 PRINT TAB 3;"THERE IS A PLE
CE OF PARTIAN GOLD IN THIS ROOM,Y
OU WILL BE RECH IF YOU LIVE L
ONG BROUGHT."
2060 FOR M=1 TO 40
2065 NEXT M
2070 IF GOLD<4000 THEN PRINT TAB
4;"YOU NEED "10000-GOLD;" MOR
E GOLD BAR."
2080 GOSUB 4000
2100 GOTO 400
2500 FOR M=1 TO 20
2505 NEXT M
2505 GLE
2510 PRINT AT 0,0;"*****
*****"
GOLIN *****
*****"
3000 PRINT
3010 IF ASM=1 THEN GOTO 3700
3020 PRINT TAB 3;"YOU HAVE JUST
MET A GOLIN.THIS HORRIBLE LITEL
E BEING AND OTHERS OF HIS KIND
HATE HORRIBLE."
3030 PRINT
3040 IF RING=1 THEN PRINT TAB 3;"
YOU HAVE THE MAGIC RING,BUT IT I
S SO DARK IN THIS PARTICULARCAVE
THAT BEING INVISIBLE IS NO GOOD
TO YOU."
3050 PRINT
3060 GOSUB 4000
3070 PRINT TAB 3;"IN THE DARKNES
S OF THE CAVE,THE GOLIN CAN SEEE
E YOUR POSITION,BUT YOU CA
NNOT SEE HIM."
3400 GOSUB 4000
3440 GLE
3450 PRINT TAB 3;"THE GOLIN IS
NOW CHASING YOU AROUND THE CAVE
,WILL HE CATCH YOU?"
3460 GOSUB 4000
3460 LET R=0

```



```

3470 IF R<.75 THEN GOTO 3750
3480 PRINT TAB 3;"HA HA HA,HE HA
S GOT YOU."
3490 IF R<.25 THEN PRINT TAB 3;"
YOU HAVE BEEN BOILED IN OIL.

```

```

*****"
3700 IF DCH<.25 AND R<.5 THEN PRI
NT TAB 3;"YOU HAVE BEEN ROASTED
FOR DINNER

```

```

chomp chomp chomp yui
p "
3710 IF DCH<.5 AND DCH<.75 THEN PR
INT TAB 3;"YOU HAVE BEEN DROPPED
INTO A LAKE OF HOTTER LAVA

```

*****"

ee "



```

*****
3030 PRINT
3040 PRINT TAB 3:"YOU HAVE ENTER
ED A CAVE WHICH HAS MANY HIDE
EN FITS CONTAINING THOUSAND
S OF SERPENTS"
3050 PRINT
3060 IF ARM=1 THEN GOTO 3400
3070 PRINT TAB 3:"CAN YOU GET TH
ROUGH WITHOUT FALLING INTO A PIT?
"
3080 GOSUB 4030
3090 PRINT
3100 LET S=RND
3110 IF S<.5 THEN GOTO 3300
3120 PRINT TAB 3:"YOU HAVE FALLE
N DOWN A PIT AND SINCE THE SERP
ENTS ARE VAMPIRES, YOU HAVE A
SCORE A BLOOD DONOR."
3130 GOSUB 4030
3140 GOTO 3200
3150 PRINT TAB 3:"YOU HAVE MANAG
ED TO GET BY WITHOUT FALLING DOWN
N A PIT."
3160 GOSUB 4030
3170 RETURN
3180 LET S=RND
3190 PRINT TAB 3:"YOU HAVE THE A
PHENSTONE WHICH PROTECTS YOU
FROM SNAKE BITES."
3200 IF S<.75 THEN PRINT TAB 3:"
YOU ARE PROTECTED FROM SNAKE
BITES, BUT YOU HAVE FALLEN DOWN
A VERY DEEP PIT AND DIED OF STARV
ATION, BECAUSE YOU CANNOT GET O
UT."
3210 GOSUB 4030
3220 IF S<.75 THEN GOTO 3200
3230 RETURN
3240 FOR N=1 TO 20
3250 NEXT N
3260 CLS
3270 PRINT AT 0,0:"*****
*****
BALROG *****
*****"
3280 PRINT
3290 IF ARM=0 AND RND=0 THEN PR
INT TAB 3:"YOU HAVE JUST MET THE
BALROG, HE IS A ---disgusti
ng--- CREATURE, WITH VERY BAD BRA
INS--- HE HAS JUST SPLIT YOU IN
TWO. -----"
3300 IF ARM=1 THEN PRINT TAB 3:"
YOU HAVE MET THE BALROG, BUT THE A
PHENSTONE PROTECTS YOU."
3310 IF RND=1 AND ARM=0 THEN PR
INT TAB 3:" YOU HAVE MET THE
BALROG, BUT YOU ARE WEARING THE N

```

```

2730 GOSUB 4010
2740 GOTO 3200
2750 PRINT
2760 PRINT TAB 3:"YOU HAVE THE A
PHENSTONE, WHICH IS PROTECTING
YOU AGAINST THE GOBLIN."
2770 GOSUB 4030
2780 RETURN
2790 PRINT " NO... YOU HAVE
ESCAPED HIM."
2795 GOSUB 4030
2799 RETURN
3000 FOR N=1 TO 20
3001 NEXT N
3010 CLS
3020 PRINT AT 0,0:"*****
*****
SERPENTS *****

```

```

4010 RING SO HE CANNOT SEE YOU.
"
3040 PRINT
3070 IF RING=0 AND ARM=0 THEN PR
INT TAB 5:"THIS IS ONLY A TEMPOR
ARY INCONVENIENCE,MEANING THAT
YOU WILL HAVE TO START AGAIN."
3080 GOSUB 4030
3090 IF ARM=0 AND RING=0 THEN GO
TO 3200
3120 RETURN
4000 FOR M=1 TO 20
4010 NEXT M
4015 CLS
4020 PRINT AT 0,0:"*****
*****"
ARTIANS *****
*****"
4034 PRINT
4040 PRINT TAB 5:"THERE ARE MANY
JAMS IN HERE WHICH IS NOT SUPP
EING SINCE WE ARE ON HARS"
4045 GOTO 4090
4050 PRINT "PRESS NEWLINE TO CON
TINUE"
4060 INPUT #
4065 RETURN
4070 IF RING=1 THEN PRINT TAB 5:
"YOU HAVE THE MAGIC RING BUT
IF IS USELESS AGAINST THE MARY
JAMS."
4100 IF ARM=1 THEN PRINT TAB 5:
"YOU HAVE THE ARRESTSTONE BUTITS N
ASIC DOES NOT WORK AGAINST WARTI
ANS."
4110 GOSUB 4030
4115 CLS
4120 PRINT TAB 5:"THE MARTIANS A
RE A CLEVER RACE,AND ARE GOING
TO GIVE YOU THREE SUESSES AT TH
EIR SECRET NUMBER (BETWEEN 1 A
ND 30. IF YOU GUESSE
CORRECTLY, THEY WILL LET YOU G
O,IF NOT THEY WILL BLAST YOU
WITH THEIR RAY GUNS."
4125 LET S=INT (RND*5)+1
4130 GOSUB 4030
4135 CLS
4134 FOR F=1 TO 3
4140 PRINT TAB 5:"---ENTER ONE
SS---"
4150 INPUT S
4160 IF S=S THEN GOTO 4200
4170 NEXT F
4175 PRINT TAB 5:"xxxxxxxxxxxxx
YOU
U HAVE JUST BEEN KILLED--bye bye
--"
4180 GOSUB 4030
4190 GOTO 3200

```

```

4200 PRINT
4210 PRINT TAB 3:"YOU SUESSED CO
RRECTLY. THE NUMBER WAS "ID
4220 GOSUB 4030
4230 RETURN
4300 FOR M=1 TO 20
4301 NEXT M
4305 CLS
4310 PRINT AT 0,0:"*****
*****"
TROLL *****
*****"
4325 IF ARM=1 OR RING=1 OR (ARM=
1 AND RING=1) THEN GOTO 4400
4330 PRINT
4340 PRINT TAB 5:"YOU HAVE MET A
TROLL.THIS IS A GREEDY CREATUR
E,WITH VERY SHARP TEETH.
HE DEMANDS 3 L
OTS OF YOUR GOLD SO HE CAN BUY
FOOD FROM THE CARTEN AFTER T
HIS DARE."
4345 PRINT
4346 GOSUB 4030
4347 CLS
4350 IF GOLD<3000 THEN GOTO 4700
4360 IF GOLD<2000 THEN GOTO 4800
4370 PRINT TAB 5:"YOU HAVENT GOT
ENOUGH GOLD,-OH DEAR- THAT MEAN
S HE WILL HAVE TO EAT YOU."
4375 GOSUB 4030
4380 PRINT "
SPRUCH SPRUCH SPRUCH
XXXXXXXXXXXX
LOOK ON THE BR
SHY SIDE,YOUNELL PROBABLY GIVE M
E
INDIGESTION"
4390 GOSUB 4030
4395 GOTO 3200
4400 IF ARM=1 THEN PRINT TAB 5:
THE ARRESTSTONE IS PROTE
CTING YOU FROM THE TROLL, BUT Y
OU MAY LEAVE HIM SOME GOLD IF YO
U WISH."
4410 IF ARM=0 AND RING=1 THEN PR
INT TAB 5:
YOU ARE WEARING THE M
AGIC RING, THE TROLL CANNOT SEE
YOU, BUT YOU MAY LEAVE HIM SOME
GOLD IF YOU WISH."
4420 GOSUB 4030
4430 RETURN
4500 PRINT TAB 5:"AW WHAT A SHAM
E HE HAS TAKEN ALL YOUR GOLD
."
4505 LET GOLD=0
4510 GOSUB 4030
4520 RETURN

```

ZX81 GAME

4900 PRINT TAB 5;"YOU HAVE ENOUGH
W GOLD TO: GIVE HER TWO LOTS."

4910 LET GOLD=GOLD-2000

4920 GOSUB 4050

4930 RETURN

5000 FOR N=1 TO 20

5001 NEXT N

5005 CLS

5010 PRINT AT 0,0;"*****
*****"

EXIT *****
*****"

5020 PRINT

5030 PRINT TAB 5;"YOU HAVE FOUND
THE EXIT. THIS IS ACTUALLY TH
E PROFESSOR'S PERSONALISED RING. H
ATTER "TRANSPORTER."

5040 PRINT

5050 IF ANK=1 THEN GOTO 5200

5070 PRINT TAB 5;"BUT YOU HAVEN'T
GOT THE AMERSTONE,SO GO AN
D SET IT YOU HORRIBLE LITTLE ADV
ENTURER,OR THE PROF. WILL FEED
YOU TO THE TROLLS."

5080 GOSUB 4050

5090 RETURN

5200 PRINT TAB 5;"YOU HAVE GOT T
HE STONE. OH YOU ARE A CLEVER
ADVENTURER. I'DE GOT TO SAY TH
Y OR YOU WOULD SWICH ME OFF
!"

5210 PRINT

5220 GOSUB 4050

5230 PRINT "FOR YOUR COURAGE,THE
PROF. MAY GIVE YOU A REWARD-CE
DSTINGS LIKE A BRACH PERHAPS
?!,THEN AGAIN,HE MIGHT NOT,4
WELL."

5240 GOSUB 4050

5240 GOTO 5500

5300 FOR N=1 TO 20

5301 NEXT N

5302 LET L1X,Y1=0

5305 CLS

5310 PRINT AT 0,0;"*****
*****" NA

010 RING *****
*****"

5320 PRINT

5330 PRINT TAB 5;"YOU HAVE FOUND
THE ONE AND ONLY MAGIC RING,WHI
CH MAKES YOU INVISIBLE TO ALL EX
CEPT MARTIANBAND BRAGS."

5340 PRINT

5350 LET RING=1

5370 PRINT TAB 5;"BARN,THAT MEAN
S YOU WILL PROBABLY SURVIVE TH
IS BARE..... OH WELL..I CAN STILL

TRY TO GET YOU KILLED."

5380 PRINT

5400 PRINT TAB 10;"I SUPPOSE..."

5410 GOSUB 4050

5420 GOTO 545

5500 FOR N=1 TO 20

5501 NEXT N

5505 CLS

5510 PRINT AT 0,0;"*****

*****"

WIND HERE **** NOT

*****"

*****"

5520 PRINT

5537 GOSUB 4050

5538 CLS

5570 RETURN

4000 IF Y=1 THEN GOTO 700

4010 LET Y=Y+1

4020 GOTO 550

4100 IF X=4 THEN GOTO 550

4110 LET X=X+1

4120 GOTO 550

4200 IF GOLD>=4000 AND X=1 AND L
EV=3 AND Y=7 THEN GOTO 5000

4205 IF LEV=3 AND X=1 AND Y=7 TH
EN GOTO 5000

4210 IF X=1 THEN GOTO 700

4220 LET X=X+1

4240 GOTO 550

4300 IF Y=7 THEN GOTO 700

4310 LET Y=Y+1

4320 GOTO 550

4400 IF LEV=1 THEN GOTO 700

4410 LET LEV=LEV+1

4420 LET A=X

4430 LET B=Y

4430 GOSUB 5900

4430 SLOW

4440 GOTO 550

4500 IF LEV=3 THEN GOTO 700

4510 LET LEV=LEV+1

4520 GOTO 4430

5000 FOR N=1 TO 20

5001 NEXT N

5010 CLS

5020 GOTO 6200

5040 CLS

5050 FOR N=0 TO 4

5051 PRINT "321a"

5052 NEXT N

5053 PRINT "131a+23a+531a"

5054 PRINT "131a+43a+831a"

5055 PRINT "131a+63a+121a"

5056 PRINT "111a+103a+31a+1000a
+31a"

```
0007 PRINT "11111+12345+2111+11111  
=1311"
```

```
0008 PRINT "F111+3ggg+2gZ+4ggg+2gZ+  
3ggg+2111+3ggg=11311"
```

```
0009 PRINT "F111+3ggg+3ggg+4ggg+2ggg+  
3ggg=F111"
```

```
0010 PRINT "F111+13ggg+2G+1ggg=G111"
```

```
0011 PRINT "F111+1ggg+2G+3ggg+4G+G111"  
="
```

```
0012 PRINT "F111+1ggg+2G+7ggg+4G+1gg  
="G111"
```

```
0013 PRINT "G111+1ggg+4G+3ggg+GG+1gg  
="G111"
```

```
0014 PRINT "G111+ggg+4G+3ggg+GG+ggg+  
G111"
```

```
0015 PRINT "F111+3ggg+2G+ggg+ggg+ggg+  
ggg+ggg+ggg+ggg+GG+3ggg+F111"
```

```
0016 PRINT "?111+3ggg+2G+ggg+ggg+ggg+  
ggg+ggg+ggg+ggg+GG+3ggg+F111"
```

```
0017 PRINT "F111+ggg+ggg+ggg+ggg+2G+3  
ggg+GG+ggg+ggg+ggg+ggg+F111"
```

```
0018 PRINT "dggg"
```

```
0019 FOR N=1 TO 100
```

```
0020 NEXT N
```

```
0021 CLS
```

```
0022 PRINT AT 0,0;"*****  
*****  
*****  
*****  
*****"
```

```
0023 GOTO 0020
```

```
0024 PRINT
```

```
0025 PRINT TAB 5;"YOU HAVE ENTER  
ED BRAGUE BECAUSE YOU DO NOT HAVE  
ENOUGH GOLD TO BRIBE THE GUARD.  
SO HE KILLS YOU"
```

```
0026 PRINT
```

```
0027 GOSUB 4050
```

```
0028 IF A1(0)=1 THEN PRINT TAB 5;  
"THE PRINCE MADE SOME WORK  
NEAR BRAGUE."
```

```
0029 IF A1(0)=1 THEN GOSUB 4050
```

```
0030 GOTO 0050
```

```
0031 FOR M=1 TO 100
```

```
0032 NEXT M
```

```
0033 CLS
```

```
0034 GOTO 0030
```

```
0035 PRINT "*****  
*****  
*****"
```

```
0036 FOR A=1 TO 10
```

```
0037 PRINT "a-z10111111"
```

```
0038 NEXT A
```

```
0039 PRINT "*****  
*****  
*****"
```

[illegible]

```

9191 GOSUB 4050
9192 GOTO 550
9200 FOR N=1 TO 20
9201 NEXT N
9202 CLR
9210 GOSUB 5030
9220 PRINT AT 5,5;"you humming  
issss...."
9230 FOR N=1 TO 20
9231 NEXT N
9232 PRINT AT 10,5;"the prof will  
I find you"AT 12,5;"to the trait  
is...."
9240 GOTO 5430
9300 CLR
9310 PRINT "=====
9311===== DISTRUSTIO
9312=====
9313=====
9320 PRINT
9330 PRINT "      YOU ARE AN ASM
ENTERED....(THE PROFFESSOR LITT
LE BROTHER!),YOU,SHAUD AND SOME O
THER MASTERSHAVE BEEN TRANSPORTE
D TO NAME."AT 5;"YOU ARE IN A
NETWORK OF TUNNELS AND CAVES.Y
HERE ARE THREE LEVELS, EACH
LEVEL HAVING 20 CAVES IT X=0 MA
KING A TOTAL OF 60 CAVES."
9340 PRINT "      YOU HAVE ABOUT
ON A LEVEL USING THE CURSORS,UP
A LEVEL USING "UP",DOWN,USE
NO"DOWN"
9350 PRINT "PRESS ANY KEY TO CON
TINUE"
9360 IF INKEY="" THEN GOTO 9380
9370 CLR
9400 PRINT "      YOU MUST COLLEC
T A LOT OF GOLD TO BRINE SNAUSE
GUARD THEN KILL SNAUS,STEEL THE
ARKENSTONE,AND FIND THE EXIT.(W
ATCH OUT FOR THE MASTERS).."
9405 PRINT "      SNAUS CAVE CAN
ONLY BE      SEEN FROM LEVEL 3 (Y
OU MUST      ENTER HIS CAVE TO BE
SEE THE GUARD"
9406 PRINT "THE EXIT IS ON LEVEL
1, THERE IS A MAGIC RING ON LEVE
L 1 TO HELP YOU.
          THE ARKEN STONE HELP
& PROTECT      YOU.--BAD LUCK--"
9410 PRINT "PRESS ANY KEY TO STA
RT"
9420 IF INKEY="" THEN GOTO 9430
9430 GOTO 500
9500 CLR
9501 PRINT AT 3,1;"LEVEL "LEV)A
T 5,14;"GOLD=")GOLD
9503 LET AB="2312"
9510 LET BC="12+32+12+32+12+32+1
2+32+12+32+12+32+12+32+12"
9520 LET CD="12+32+12"
9530 LET DE="212+3+312+3+312+3+
12+3+312+3+312+3+312+3+312"
9540 PRINT AB
9510 FOR N=1 TO 4
9520 PRINT BC
9530 PRINT CD
9540 PRINT DE
9550 IF N=3 THEN PRINT BC
9560 IF N=4 THEN PRINT AB
9570 NEXT N
9580 IF LEV=3 THEN PRINT AT 0,24
1;"B1"AT 1,24;"12+3+312"AT 2,2
4;"12+3+3+312+12"AT 3,24;"12+ 30
N +12"AT 4,24;"12+3+3+312"AT 5,
24;"312+3+312"
9590 PRINT AT 5,4;"P"
9600 RETURN
9700 FAST
9801 FOR L=1,70
9802 LET A=0
9804 LET B=7
9805 GOSUB 9900
9806 FOR N=1 TO 12
9808 GOSUB 9900
9810 LET LCK,Y)=1
9812 NEXT N
9814 FOR N=1 TO 2
9816 GOSUB 9900
9818 LET LCK,Y)=3
9820 GOSUB 9900
9822 LET LCK,Y)=5
9824 GOSUB 9900
9826 LET LCK,Y)=7
9828 GOSUB 9900
9830 LET LCK,Y)=9
9832 NEXT N
9834 GOSUB 9900
9836 LET LCK,Y)=4
9838 GOSUB 9900
9840 IF LEV=1 AND RING=0 THEN LE
T LCK,Y)=0
9842 GOSUB 9900
9844 IF LEV=1 THEN LET LCK,Y)=7
9846 LET X=A
9848 LET Y=B
9850 RETURN
9850 FOR X=1 TO 4
9852 FOR Y=1 TO 7
9854 LET LIX,Y)=0
9856 NEXT Y
9858 NEXT X
9860 RETURN
9890 LET X=INT (RND*4)+1
9891 LET Y=INT (RND*7)+1
9892 RETURN
9899 END

```

Biorhythms

Under the weather? Check up on your biorhythms with Patrick Garfield of Bedford.

This program uses the high resolution plotting capabilities of the Spectrum to enable you to chart your biorhythms — the biological rhythms of life which are said to help to determine your day to day physical, emotional and intellectual performance. If you have a printer, you can produce hard copy of your results and when they become known you are likely to find the

services of your Spectrum handy in demand to produce printouts for friends, relatives and colleagues who have previously shown little interest in microcomputing!

You may well be familiar with the basic theory of biorhythms but a little background data would probably not go amiss. Around the turn of the century a German doctor, Wilhelm Fliess

and an Austrian psychologist, Professor Herman Swoboda, working independently, discovered that certain physical and emotional problems which they observed in their patients seemed to come and go according to a regular pattern. The variation in physical symptoms was found to follow a 23 day cycle whilst the emotional cycle spanned 28 days. After trying out theories on large numbers of patients, they became convinced that man's physical and emotional potential varies regularly day to day according to fixed natural cycles which commence at the time of birth.

Ups and downs

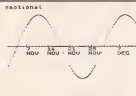
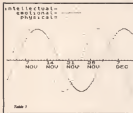
In the 1920s their theories were taken up by Dr Alfred Tollerat working with students at Breslau who he described their intellectual performance over a period of time and when he collated his results he found that the declines and improvements in each student's scores followed a predictable pattern not of 23 or 28 but of 33 days. Shortly after their discovery these natural cycles were put to use both in Switzerland and in Japan to help in detecting accident

prevention programmes for which considerable success has been claimed. Despite this widespread public interest in their use, biorhythms were not really seen until the 1970s when further scientific investigation confirmed their existence and led to their use in their calculations became available.

The procedure for computation is not really a difficult one. If we accept that fixed patterns of potential are set up at birth which continue throughout life we should be able to work out a man's physical, emotional and intellectual potential for any given day thereafter. All we need to do is to find out how many days have passed since the day of birth and then use suitable fairly simple mathematics to ascertain his current position in each of the cycles. This process forms the basis of the Biorhythms program.

Choose a number

Having started with the arithmetic involved, the program allows you to present the biorhythm information in one of three ways. Options 1 and 2 produce high resolution graphs



| highs and lows | high | low | score | sign |
|----------------|------|-----|-------|------|
| 4 | 0.1 | 0.1 | 0.1 | 0.1 |
| 3 | 0.2 | 0.2 | 0.2 | 0.2 |
| 2 | 0.3 | 0.3 | 0.3 | 0.3 |
| 1 | 0.4 | 0.4 | 0.4 | 0.4 |
| 0 | 0.5 | 0.5 | 0.5 | 0.5 |
| 0 | 0.6 | 0.6 | 0.6 | 0.6 |
| 0 | 0.7 | 0.7 | 0.7 | 0.7 |
| 0 | 0.8 | 0.8 | 0.8 | 0.8 |
| 0 | 0.9 | 0.9 | 0.9 | 0.9 |
| 0 | 1.0 | 1.0 | 1.0 | 1.0 |
| 0 | 1.1 | 1.1 | 1.1 | 1.1 |
| 0 | 1.2 | 1.2 | 1.2 | 1.2 |
| 0 | 1.3 | 1.3 | 1.3 | 1.3 |
| 0 | 1.4 | 1.4 | 1.4 | 1.4 |
| 0 | 1.5 | 1.5 | 1.5 | 1.5 |
| 0 | 1.6 | 1.6 | 1.6 | 1.6 |
| 0 | 1.7 | 1.7 | 1.7 | 1.7 |
| 0 | 1.8 | 1.8 | 1.8 | 1.8 |
| 0 | 1.9 | 1.9 | 1.9 | 1.9 |
| 0 | 2.0 | 2.0 | 2.0 | 2.0 |

Table 2

| select option |
|--|
| 1: intellectual, emotional and physical factors shown on separate graphs |
| 2: all cycles shown together on one graph |
| 3: a list of high and low points for a twelve month period |

Table 3

of your birthdate for any month of any year you combine, with the option to obtain a hard copy if required. Option 2 (see Table 3) displays the intellectual, emotional and physical cycles together on one graph, allowing immediate comparison whereas Option 1 (see Table 3) presents a separate graph for each of the cycles making a more in-depth analysis.

the particular cycles which you may be interested.

Option 3 is a fascinating, if slow moving, routine which checks your birthtime for a whole year from the chosen date and points out a list of those dates when all three cycles are high at the same time or when they all hit a low point together. You will see from Table 3, that the display shows the date,

followed by an indication of the height of each of the cycles on that day (where 100 is the highest point possible and -100 the minimum). The first column indicates the level of significance of each particular date. For example, a significance of 10 means that all the cycles are peaking more or less together and therefore physical and intellectual energy available should be at a maximum in that day for planning (see next). A value of 2 would indicate that the cycles are on the high side but not necessarily together. A score of -10 shows that all the cycles are hitting rock bottom together (you might be well advised to stay in bed!).

be prompted to enter your date of birth starting with the day of the month, then the number of the month, then the year. Next you will be asked to enter the month to be considered (followed by the year. Options 1 and 2 begin to draw graphs on the screen, while Option 3 will first prompt you to list in the case, as it can sometimes take a couple of minutes to work through a whole year's calculations, the Spectrum simply displays a little message at the end of the list to tell you which month is worth thinking about so that you will know that it is alive and can follow its progress through the year. All three options offer the choice of entering "0" if you wish to jump to the prompt, or just pressing ENTER if you don't.

You will see from Table 3 that the structure of the program is fairly straightforward, however, it seems to be amazingly difficult to get a computer to understand when it has to count 28 days for February with the result that some of the program lines get a bit complex.

Typing and loading

When you have typed up the program you should see it by entering CDDT (EDIT) unless you have a favourite save routine of your own. On loading, the program will run and offer the three options outlined above (see Table 4). When you have entered your selection, you will

| program structure |
|---|
| 100 subroutine to draw graph |
| 200 subroutine used in calculating number of days since date of birth |
| 300 subroutine used in adding high/100 to graphs |
| 400 introductory routine |
| 500 option 2 routine |
| 600 option 1 routine |
| 700 option 3 routine |

Table 4

```

10 REM SPECTRUM BIOHYTHM B P
  A,BARFDEL
20 GO TO 1000
30 DATA 31,28+1 AND 1+2 AND
  INT ((y/4)-y/4)/41,31,30,31,30,3
  1,31,30,31,30,31,31
40 REM *****
50 PLOT x=4-x*8,72
60 IF x/4 < 1 INT (x/4) THEN
  RETURN
70 PLOT x=4-x*8,73 LET data=
  data+1
80 RESTORE 50: FOR q=1 TO 12
  LET c1 NEXT q
90 IF 1=2 AND 1 INT ((y/4)-y/
  4)/4 THEN LET c=2P

```

Physical



```

140 IF NOT (INT (date-1/12)=
date-1/12 AND date%1) THEN GO
TO 190
170 FOR w=2 TO 25: PLOT w+xx
NEXT w
180 IF (x-xx%)/PI%2 THEN PRIN
T AT 13,(x-xx%)/PI%date-1: PRIN
T AT 14,(x-xx%)/PI%date-1:GO
END
190 IF date% AND NOT (INT (y
/4)/4 AND w%1) THEN LET w=1
: LET date=1
200 IF date%1 THEN LET w=1
: LET date=1
210 RETURN
220 REM *****
230 RESTORE 50: LET w=0: FOR s
=1 TO s-1: READ w: LET w=xx%
NEXT s
230 LET yy=yy-1750:GOSUB INT (
yy-1750)/4:
230 LET x=xx%+y
230 RETURN
400 FOR w=0 TO 40 STEP 5: PLOT
100+w,173-w: NEXT w: RETURN
500 PRINT AT 3,0:PRINT date-1:G
O TO (w-1)/2+12: RETURN
5000 REM *****
5010 CLS
5020 LET A="JANFEBMARAPRMAJUN
JULYSEPOCTNOVDECJANFEB"
5030 LET B="intellectualemotion
al physical "
5040 PRINT "select option""1)i
ntellectual emotional and p
hysical cycles shown on a
separate graphs""2)all cycles
shown together on one graph"
5050 LIST OF high and low point
s for a twelve month period"
5060 INPUT d
5070 CLS
5075 INPUT "day of month born "
: d
5080 INPUT "month "
: m
5090 INPUT "year "
: y: LET yy=y+
1750 AND y%100%1: GO SUB 300
5100 LET date%1: INPUT "enter mon
th for calculation "
: w: LET w=
5110 INPUT "year "
: y: LET yy=y+
1750 AND y%100%1: LET w=1: LET d
=1: GO SUB 300
5120 LET w=1
5130 LET d=xx-w-dm
5140 LET w=1
5150 LET w=1: IF d=1 THEN GO
TO 3000
5160 IF d=3 THEN GO TO 4000
5200 REM *****
5210 PRINT AT 0,0:"intellectua
l"
LET w=1: LET w=1: GO SUB 400
5220 PRINT " emotional"
LET w=2: LET w=2: GO SUB 400
5230 PRINT " physical"
LET w=3: LET w=3: GO SUB 400
5240 LET date%1: LET w=1
5250 FOR w=0 TO 250:xx%
5260 LET y=72+xx% SIN (x/77% PI
)
5270 IF x/4=INT (x/4) THEN PLO
T w+xx%,y
5280 LET y=72+xx% SIN (x/77% PI
/2333)
5290 IF w/2=INT (w/2) THEN PLO
T w+xx%,y
5300 LET y=72+xx% SIN (x/77% PI
/2333)
5310 PLOT w+xx%,y
5320 GO SUB 100
5330 NEXT w
5340 INPUT "enter P to print"
: IF w="P" THEN COPY
5350 STOP
5400 REM *****
5410 GO SUB 300
5420 LET date=1: LET w=1
5430 FOR w=0 TO 250:xx%
5440 LET y=72+xx% SIN (x/77% PI
)
5450 PLOT w+xx%,y
5460 GO SUB 100
5470 NEXT w
5480 LET date=1: LET w=1
5490 INPUT "enter P to print"
: IF w="P" THEN COPY : LPRINT
: LPRINT : LPRINT : LPRINT
5500 CLS : LET w=1
5510 GO TO 3040:xx%
5520 GO SUB 300
5530 FOR w=0 TO 250:xx%
5540 LET y=72+xx% SIN (x/77% PI
/23/23)
5550 GO TO 3000
5560 GO SUB 300
5570 FOR w=0 TO 250:xx%
5580 LET y=72+xx% SIN (x/77% PI
/23/23)
5590 GO TO 3000
5600 STOP
5600 REM *****
5610 PRINT " high and low:"
PRINT " date int mon ps
ys sig"
LET w=1: LET date=1
FOR w=0 TO 365
5620 PRINT AT 3,0:PRINT w-3 TO 3
: d
5630 LET w=1: LET date=1

```

```

4040 FOR w=0 TO w=360
4050 LET w=0: REM 1st FS 40/200
4060 LET w=0: REM 1st FS 40/200
4070 LET w=0: REM 1st FS 40/200
4080 RESTORE 000: FOR q=0 TO w: R
500 G: NEXT q
4090 LET w=0
4100 IF w=0 AND 1 INT (yy/40)yy
/40 THEN LET w=0
4110 LET date=date+1
4120 IF date=31 AND w=12 THEN L
BY w=1: LET date=1: LET yyyy=1:
LET ch=1
4130 IF date=0 AND NOT 1 INT (y
/40)/4 AND w=1 THEN LET w=+1
: LET date=1: LET ch=0
4140 IF date=0 THEN LET w=+1
: LET date=1: LET ch=0
4150 IF (year=1 AND year=2) THEN P
RINT AT yy/2,0/40/200-2 TO 2000
4160 IF (year=1 AND year=2) AND (year=
year-2)/4 THEN GO TO 4300
4170 LET yyyy=1
4180 PRINT AT yy/1,0/40/200 TAB
20/100/100/100/100/100/100
4190 IF w=0 THEN PRINT TAB 10
1000

```

```

4200 PRINT TAB 10 ABS 1 INT 10
1000/10
4210 IF w=0 THEN PRINT TAB 10
1000
4220 PRINT TAB 10 ABS 1 INT 10
1000/10
4230 IF w=0 THEN PRINT TAB 10
1000
4240 PRINT TAB 10 ABS 1 INT 10
1000/10
4250 IF w=0 THEN PRINT TAB 10
1000
4260 LET w=0: ABS 1000/100-2.2:
LET w=1: INT 1000/100+2.2: PRIN
T TAB 1000
4270 IF yy=20 THEN GO TO 4300
4280 INPUT "enter P to print"lv
: IF w="P" THEN COPY
4290 LET yy=21: CLR
4300 NEXT w
4310 INPUT "enter P to print"lv
: IF w="P" THEN PRINT AT yy/2
,0/100/100/100/100/100/100
4320 STOP
**** SAVE "BIOGRAPHS" LINE 1: P
RINT "VERIFY": VERIFY "BIOGRAPH
S": CLR : PRINT "O.K."

```

DENIS THROUGH THE DRINKING GLASS



Why did Denis Thatcher visit the Pope wearing a turban and a pashmina and carrying a lean rooster? What was in the cherry blossom? What is that strange tramp in the woods?

Only you can discover... but first you must deal with Ben Luridson, Herman Tabori and lots of other characters in this satirical political adventure.

Written in humorous verse. 100% machine code — using the Quill from Quest! Loading is often faster than booting — don't play it safe with it — 48K Spectrum (20 100) only.

ARCHIMEDES' MAGIC SCREW

Probably the most complex logic problem you will ever play. 48K Spectrum (20 100) only. P&P.

Fresh from translating the camera-driven game stream Archimedes is up to his neck in hot water again. Help him make new discoveries — help him discover the secret of the universe — help him find the loop.

WAIT FOR THE DENIS BEQUEL! THE TONN!

APPLICATIONS

Dept. 22, 8 St. Paul's Road
Peterborough PE1 3DW

compel systems Masterfile

YES — Microdrive compatible!

Spectrum 48K.

Designed as the data base filing system for the 48K Spectrum — MASTERFILE is machine coded. Possibly gives you 32K (most say 16K — 20 fields per record) — up to 128 characters per field — multiple line records for numbers or character strings — 48K presentation in any one of 20 user defined displays which may be requested by any field — LOGS MADE for a fast processing — the best combination of the software.

Order 1/80 June 1983

With example file and manual. £15.00

Drawmaster

Spectrum
48K

DrawMASTER is the ultimate (affordable) master order for the Spectrum — enables you use 10 010 entries with 8 divisions 3 speed hard disk says — fast 100 — interpretation facility for all or part of the screen plus all the Spectrum colours and attributes — over 50 commands in all.

With example manual. £9.95

DLAN DISPLAY LANGUAGE

Spectrum
16/48K

DLAN (the 100) DISPLAY LANGUAGE is a powerful high speed software for generating (SYN) 48K TEXTUAL DISPLAYS for advertising and education. All commands are single letter or symbol — each 8-way scroll of 17 types from through user defined screens.

With detailed manual. £7.95

All programs marked for disk by return from master V&T and garage codes. Contact for full list.

Dept. 22, 8 St. Paul's Road
Peterborough PE1 3DW



In Brief

■ Photographs who sell the widely syndicated *Spectrum*, *Before Assembly* and *Monitor* have re-written both programs and they now contain completely making full use of the microdrive, network and MS232 facilities.

The new version will work with both new and Maratone versions and the price remains the same, £14.95 for the *Assembly* and £17.95 for the *Monitor*.

If you already own these programs and want to upgrade to the new versions, then this version will replace them for £17.95 each if you send the earlier versions back to 8 Connaught Hill, West Wootton, Kent BN9 9BB.

■ *Flagship Software* well known for their range of mind-stretching puzzles and strategy programs have now added to the world of arcade style graphics. However, their new program, *Koalas Power* is predominantly a strategy simulation game.

With your on-board computer flushing out space craft in the outer reaches of earth, you try to break havoc among the other space travellers. Many and varied are your problems including a monstrous alien race.

Koalas Power can be bought at 41 Haymild Road, Burnham, Bucks SL1 8SE for £5.95.

■ *Mean Beggy* Do file and 1984 (The Year After) are the latest Spectrum offerings from Visions, a company which has gained a large following in a short time.

Do file is an interesting looking design for the current programmer and is described by Visions as a program generator that will teach you how to program and then help you apply it to any project you wish — from home computing to retail planning.

At £24.95 for Do file you've got to be serious!

■ Hello and welcome to W.D. Software who have produced one last offering, "Endword" for the 48K Spectrum. This is described as a graphic adventure reading game and is available from Himes in Mary, Jersey, Channel Islands for £5.00.

Although a new company, the writer, owner/producer Mr C. C. Wilson Davies has already created a program through *Workforce* called "Do Not Pass Go".

■ Hit on the heels of *Vampire Village* and *Space Island*, Tardis Software have released "City" another in their series which they describe as "exciting real time adventures".

■ *Shalin' Screens'* latest cassette LP, "The Top War'n' Blue" contains a Spectrum program as the and. Despite the subtlety, I wouldn't recommend buying it just for the game — a variation of the old "George" fan game of which many magazines (DCC) have published versions.

True, the game is in mc and at the hardest level is impossibly hard, but just consider it a bonus if you are already a *Shalin' fan* (Moggers forbid) me to mention that I used to know Shirley in the "Shalin' days).

either directly from the simulated keyboard or by entering the notes by note.

The music thus created can then be heard, altered, edited or saved. Saved music can be reentered for further modification or for listening to.

This is a very comprehensive package which has all the features a budding musician could want. I am interested in the musical side of the Spectrum and up to now have found that the major programs with the music programs on the market was that they relayed the music too slowly

adding was virtually impossible and a slave printed was not feasible.

Well, *Musicmaster* has solved ALL these problems and I admit to being very impressed. This probably pushes the musical side of the machine as far as it will go without recourse to extra hardware.

My only complaint is that some of the operating procedures could have been less far explained with more detail given in the manual. The manual section is well written and very useful.

Building on success

It seems that for Clive and Joan concerned with making the most of their computer, even the buildings are working towards them. Local Bristol's new £750,000 computer centre in Cambridge has recently been awarded a major certificate from the Business and Industry Panel for Environmental Award 1984.

The centre was purpose planned for Sinclair and companies. Cambridge Institute with innovations in architectural design, interior finishing and environmental control systems. As can be seen, traditional brickwork is combined with stainless steel and glass to give the centre a very modern look. The yard, too,

sees the building and its entrance. Part built from, formed into an enclosed atrium.

One of the most interesting features of the building is the integrated control system which is based on an integral wall. This, together with a second facade, supplies water at a constant 12°C all year round. Supported by a solar energy facility in the central court, the whole microprocessor controlled system automatically selects the most effective and energy efficient heating method, matching between electric heat, radiant thermal store and gas boiler. The system also controls all lighting.



Alchemist drives you Stonkers!

Releases from *Imagine* are always worth noting and two exceptional packages arrived recently in the ZX office. Both are for the 48K Spectrum and are priced at £5.95. I ran both programs through my magazine fairly and they were enough to see that they are both superb

games which will need a lot of playing before being mastered.

Stonkers is a mini strategy game which uses graphics and an element of arcade action. It is probably the closest in philosophy to the far on the traditional wargames theme. Written by John Gibson

Q200M and **Molar Maul** the same as a mag of a creature with two opposing forces of equal strength on either side of a river mouth.

Deployment of your forces against monstrous plains and mountains in an effort to capture the enemy line (computer part) and HQ while defending your own is a complex task with thousands of variations that a five minute game but one which I found fascinating and hard to tear myself away from to write this mail.

Alchemist is Imagine's version of an arcade adventure game. Many companies have attempted this with varying degrees of success. The Hobbit was a superb text game with graphic pictures. Talula surpassed the graphics, both of the Things and Little Jimmy went outside games with a sequel. The first ideas perhaps make this an outstanding game and, remembering that I only had time for a quick look, the theme and layout appear involved enough to ensure a lot of playing.

The plot puts you in control of the alchemist who has to search for four pieces of a hidden scroll which will unlock his powers to lift his enemy, the warlock. The Alchemist has the power to transform himself into an eagle and fly - an impressive trick! From the Westchicken (Ed Zap)

I will get our regular reviews to look at these in more detail but meanwhile check them out at your nearest stockist!



Booked!

Ruffe publishing company have launched an interesting series of books accompanied by tapes with Spectrum programs. The programs complement the exciting fiction stories which are of the fast action adventure type. Three book/tape sets form a series called 'The Korh Trilogy' written by PK Midlane, another author reduced by the lure of the main.

Excitement is the name of the game as you journey beyond the outer limits to join the members of Intergalactic Force in their fierce and it genuine battle against the mighty Korh aliens. Each pack contains an illustrated book, and cassette with three individual programs apiece.

The titles are 'Escape from Arkham', 'Besieged' and 'Into the Empire' and are reasonably priced at £4.95 each. 'The Warlock of Pinetop Mountain' is the fourth title, a number

one children's bestseller which has already sold a quarter of a million copies. This book was a good attempt to emulate the cult role playing game of Dungeons and Dragons where



finding the hidden keys and defeating the multitude of fiendish monsters.

This is sold as a book/tape pack for £6.95 or as a tape only for £3.95. I am wholeheartedly in favour of encouraging the art of reading and recommend you look these up and see for yourself!



In Brief

Microphone have sent us their latest game, 'Whistle' is never. Selling at £5.95 it is a drive-your-bike-racing-and-jumping-robot hazards race game.

What makes it special is the impressive motorcycle graphics, especially the variety of crash sequences. My family loved this one and it is this month's latest family favourite.

Two new programs have arrived from Innovative Software. **Mountains of Kin** is the first in a three part series of traditional text adventure games. I completed most the opening scenes but not my demise soon after, another one for adventures fans to check out.

The other is 1984 fanny being **Mrs Thatcher?** (It's even short it is just in there somewhere!) This simulation game gives you the chance to rule the country - a sophisticated version of the old 'Kingmaker' game. Ready games cost £5.95 from 54 London Street, Reading RG1 1AB.

Probably the most unusual program to arrive is 'Diabetes', the first in a series for the Spectrum entitled 'The Positive Health Program', from Busto Software.

Intended to help diabetics understand all about the subject and how to keep it under control, one side is for health users and the other side for those who are not.

Using graphics and a question and answer technique, this is a really helpful program which could have a use in schools for health education.

Superleague is a program released by Corel Software of 33 Langford Crescent, Basingstoke, Hants RG24 0BA for £6.95.

The company claims that it is the most sophisticated simulation of its type, containing a full 22 team league and 42 match action.

Parsons Computing is another new company which we welcome to the fold. Their first release is **Guerrilla 1** for the BBC BASIC and contains four games for £4.95. I have sent this tape out to our reviewer for a proper assessment in the next issue.

in Brief

■ ZX81 owners are also remembered by Software Farm, Fleetpost 05286514. Brian RSE 277 who have produced a three graphics game to run on the standard 195 ZX81, no hardware needed.

With a screen resolution the same as that of the Spectrum, Flyer Race is a challenging "Motor" type game and costs £4.95.

■ A set of computer related inventory adventure story books have been marketed by Amstrad. This is an unusual venture which features two boys (not no girl!) and solve mysteries with the aid of a computer.

The gimmick is that programs are given which the reader can enter on his own machine (they are compatible with most popular computers to solve a hint).

At £1.25 each this could be a useful tool with which teachers can encourage reluctant readers in their classroom, battle against literacy. The name? 'The Fortis Brothers', what else!

■ Another well established name, Quicksilver, recently launched a new range of games. Four of these are for the Spectrum and include the titles: Dragondrill, Fred Lazarus and in complete contrast The Freedom. Based on episodes from Raymond Briggs, last selling book. I wonder what the themes are of ever seeing Fungus the Bogymen on our television screens?

First of a series?

As one company collapses, another rises. Soft Shop and have opened their first shop at 44 St Peters Court, Chalfont St Peter in Buckinghamshire, are rising.

The shop will stock in excess of 1,000 popular computer programs for the major computers, together with books, blank data tapes, leads, peripherals and a host of other accessories. It will also provide expert advice for customers to get hands on experience.

Stuart Kitchin, the managing director, said: "There is a desperate need for specialisation of this kind, computer hardware outlets do not have the experience of fast moving consumer goods."

But what Chalfont St Peter? "We chose it as a launch pad because our relationship above a

high percentage of home computer owners in the surrounding areas. People are prepared to travel quite some distance to get what they want."

Stuart has a lot of experience in retailing and advice is encouraged customers to try out programs before buying. The plan for the first few other branches is to establish well as chosen from the locality in which the shop is set and they will be computer enthusiasts who will be trained in a very special way to meet the need of a Soft Shop.

We look forward with interest to finding out the locality of the next shop in the chain. Will it become a chain store rival to Marks & Spencer?



A twosome from Hewson

Hewson Consultants have not forgotten that many Spectrum owners are using 195 and their latest releases are Nightflight 3 and 3D Battles Attack. I wonder if the fact that Battles apart backwards in Battles has any significance!

In my usual column you I find both games and, as is to be expected from a company with the experience and reputation of Hewson, was impressed with both of them. However it is not, I do actually dislike more games. It's just that the standard seems to be very high recently!

Nightflight 3 is an advanced version of their previous game Nightflight 2 and, surprise, surprise! This improved version contains a shifting perspective which shows the correct view of runway lights and surrounding terrain from whichever direc-

tion the aircraft is approached, and the engine sound is more realistic, varying with the engine speed.

A printer copy of your performance rating is also available after each flight. Max Male, the author, is a keen pilot and is on an audio controller by profession.

3D Battles Attack is a very impressive 'shoot the alien game' the graphics are excellent and the 3D effect is obtained by use of perspective. You are a tank driver racing through city streets trying to destroy alien cars which sound and start you. Great action display and I found it very addictive, two more for our baby tomorrow!

Nightflight 3 and 3D Battles Attack run on any Spectrum and cost £7.95 and £5.95 respectively.

A quest is over

Adventure games have a following which is so strong that a magazine dedicated solely to them has been marketed. If you are a bit like me, get so far than get stuck and sometimes never seem to be able to find the time to go back to it, it is heartening to hear that someone manages to complete a game!

Hewson Consultants' adventures, 'Quest' has been created by Fraser Hubbard, a fifteen year old from Geddis in Kent. Andrew Hewson, head of the company and microcomputer expert, was amazed that it only took him about six weeks to complete.

"We expected that it would take someone at least six months to create Quest so we were very surprised when Fraser spent the effort and proved he had completed it by meeting the ending."

Fraser spent many hours involved in the game during the school holidays and his own computer so the game probably means that he made

better minutes than might be expected. He bought his Spectrum with some of the money from a compensation award he received because of an accident last year when he was knighted off his bicycle. Fraser is at present studying for his O levels, one of which being Computer Studies and hopes to make a career in computer programming.

Fraser's family are all interested in computers but he has run away of the rest of the family and become the household expert. He prefers to play adventure games, finding them "better and more interesting than arcade games" and says that he is looking forward to the launch of the next Hewson adventure game, Fantasy.

Although Fraser admits that he had a little help from the Hewson office, the majority of the game and the final stages were solely by himself. His verdict: "Quest is hard, but not too difficult to make you give up, you have to use the



TV or not TV

Buyer is one of the first to acknowledge the existence of the computer with the production of their A61433 Thomson 541 Colour TV. It is designed with a special full computer connection socket at the base of the set which is pre-tuned to a special station.

The timing of the set is also better for computers as it has

a natural screen which is related a few inches from the base to allow the computer or games console to sit at them without obscuring the screen.

Well, worth considering when the connection between computer and family TV is now given although the price of £249.00 seems a little expensive for a second set.



often you're given a full look for the simple solution instead of complicated answers. Guest has a lot of the answers.

Finally, a quick tip: "Keep the ring, but just up and drop the golden chain!"

In Brief

■ Two of the speech units on the market are likely to lose their voices. Timedex's speech units EXM and EXD are being discontinued. When asked by yours truly "why?" Timedex replied "No reason."

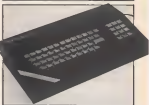
The other unit likely to disappear is the Computer Add One's EX1 Speech Synthesiser, the manufacturing company is no longer producing them. An Add One's spokesman said that they were "considering alternatives."

■ The ZX (PRINT) Centronics printer interface for the Spectrum from Euroelectronics is now being supplied compatible with the Smartr interface 1 and Microdow. Don't despair if you already have the ZX (PRINT) Mk1 or Mk2, they will supply you with a conversion kit to ensure compatibility.

This conversion consists of a momentary switch in one of the connectors which you can fit yourself for £1.80, or if you're lazy, get fitted for £3.35 by Euroelectronics at 28 Clarence Square, Chislehurst. Telephone 01-855 229.

■ Core Software, producers of the EXM1 monitor have announced the arrival of a monitor for Spectrum owners. Further details can be obtained from Core at 8 Parliament Road, Thame, Oxon.

■ Ed's Tip: Keep an eye open for Morris peripherals. I hear a rumour that they are developing a 5.25" disk drive package for the Spectrum priced around £220.00.



The key to success?

Transform Ltd, well known for their range of business software, have ventured into the field of Spectrum with one with the launch of this professional keyboard. Up until now you had a choice of keyboard with a copy of the Smartr keys and a numeric keypad (EX Thrukey) or a keyboard modified to simulate a typewriter like layout with a full sized space bar (Fullkey).

Transform have combined the two and produced a

keyboard which they claim is suitable for everyone's needs, home surroundings and word processing.

The keyboard has been designed to incorporate the micro drive, a portronics interface and the power supply. It has 85 keys including the full sized space bar, a large ENTER key, and a numeric keypad. "G" mode can be accessed by a special single key and a decimal point key is supplied on both the numeric and the

normal keyboards.

One very useful feature is an on/off switch with a LED at the end. Transitions is supposed to be easy, no soldering is required. I phoned Transitions and was told that they have had a good response to their adverts so far. Their output is modest 100 per month, but they already have plans to in-

crease this.

When you receive a model for review we will give you more details, but meanwhile you can get one from Transitions Ltd, 43 Oaks House, Portchester Road, Kent. A little more costly than its rivals, the keyboard will set you back £88.88 plus £2.00 postage and packaging.

A Byte in time

Fed up with waiting for the Microdrive to become available in the shape of Rapid test discs, more storage? Perhaps the new Byte Drive 500 units might be worth a look. These are floppy disc drives using single sided, double density 3" 1/2 Compact Floppy Discs with a formatted capacity of 325K per side in 11 seconds. This gives a total of 650K and typical access time to less than 3ms.

The unit is housed in a tidy case measuring 73.5mm high, 183mm long and 121mm wide. Double sided drives and expanding the capacity to 1M are planned developments during the year.

The system developed by ITL and Tyrol Systems is unusual in that the conventional and combination interface card which would normally connect the computer to the disc has been eliminated and has actually been built into the cable itself.

The cable contains all the disc control hardware and incorporated a 1.5" x 2" plastic slide mounted on a 94 way IDC connector. The company writes, "The mounted slide encapsulated in custom hybrid on a ceramic substrate, which interfaces all the control on-chips needed for the Disc Operating System", so now you know my head aches!

Furthermore, the main components are a U.S.A. 18K ROM and a Disc Controller Chip. A power supply unit is supplied in a matching case and a manual is available. Upgrading to a 3.5" drive is also planned for the future. Initially produced for the Citi, leaders to the BBC and the Spectrum followed and should be available now.

Oh, just one minor thing, it will cost you £280 + VAT for the complete package of Hybrid cable, drive power unit, DOS (Disc Manual and power supply cable).



A strategic win

It seems to be the return of winners and personalisation. The winner of the 1983 Cambridge Award was Mark Lucas's commercial analyser from BSM. The award is sponsored by software houses (Cam Computer Simulation and Simulink User magazine) and is intended to encourage intellectually stimulating games programs for the Sinclair computers.

Mark, with £1000 for his

original strategic wargame for the Spectrum, *Battle 1807*, which is now marketed by CDS. Second and third prizes for the Spectrum section were won by *Ali Whizzer* and *Hi Hoops* for their programs, *War 70* and *Ologopoly*. The second and third prize in the ZX81 category were the graphic adventures *Bravely* and *Barons Quest*.



Chat up your Spectrum

Orion Data Limited, a Brighton based company, have made a development which they claim could be "as significant as the advent of home computers themselves". Ready or not? So what is it?

Enough of the suspense, for a few cost Speech Recognition Unit which they reckon is probably the first of its kind in the world. I wonder what William Stuart Systems Ltd will have to say about that, as they have had a similar unit on the market for the last year or so at £49.00.

But back to the Orion unit, called the "More Command". It transforms commands spoken into a microchips into signals instantly obeyed by the computer. A voice print is taken of

each new operator so that it doesn't matter what accent, vocal pitch or pronunciation you use, the unit will recognise it. This also means that you can control it in any language as it has international appeal.

Orion suggests that it is initially best to use the More Command to replace manual keyboard or joystick control in computer games, especially the more strategic types.

The price is £49.95 for the complete set of Speech Recognition Unit, Instruction Manual, microphones and cassette which includes a free game. The whole lot is supplied in a gift type box from Orion Data Ltd, 51 Goodwin Street, Brighton, East Sussex.

Christopher Columbus would have had an easier life with Eric Hutchinson's program.

This program was designed by Eric as a specialist program for yacht sailors, to practice their navigation, but it impressed me as being of great educational use and also makes a fascinating simulation.

If you fancy your hand at round the world sailing, try this program first! I'll let Eric tell you about it.

This is a navigation program designed for use by small yachts.

It is menu driven and has the following facilities:

- 1 Course and distance from a choice of present position, last fix or estimated position
- 2 Estimated position from course and speed entered in response to prompts.
- 3 Fix from horizontal sextant angles
- 4 Keeps a continual record of the destination which may be changed at any time.

In use, the program works as follows:

The landmarks or beacons are entered into the array in response to prompts. The program is then saved to tape. On reloading the program the beacons are available for position fixing. First, a course is asked for and the present position and destination entered. A course and distance is then protected. This is used by the program to find the estimated position at any time. When a fix is required the beacons to be used are entered from left to right. The program will then ask for the left hand side horizontal angle and then the right hand side. The program then displays the position by bearing and distance from the centre beacon and so Latitude and Longitude. It will also update the array.

To use the program

On any spare evening set up your ZX81 and load the program. Get out the charts of your cruising area and pick out suitable landmarks for taking bearings. Write down the latitude and longitude of each, numbering them from 1 as you go. For convenience, the numbers could also be written alongside the landmarks on the chart.



Follow the instructions for entering beacons (as I said all landmarks) and when you have finished list the beacons and check all have been entered correctly. If all are correct place a new, good quality cassette in the cassette recorder. Plug the connecting wire into the cassette (marked Mic) on the cassette recorder and in the ZX81, and follow instructions to save to tape. The cassette now holds the fixing system and all the beacons you have entered.

Before the cruise

Set up the ZX81 and load your new cassette program. During the cruise pick three suitable



beacon and enter their numbers from left to right as seen from ahead. Enter your horizontal angles and headings to pass, HPM, HE after each entry. The screen will show your present position as a bearing and distance from your centre beacon and as a Latitude and Longitude.

If at any time you see a mark you can use, which is not on your list, simply go to 0 to enter beacons and enter lat and long remembering to keep a note of the number, write it alongside the mark, then list the beacons and check that the number is correct. If you have entered some beacons during a cruise then follow the instructions to save or save before switching off.

A few comments

One or two points may be of interest.
1 The program was designed for the yachtman to use rather than the computer help-

lyert. To this end, as far as possible, I have tried to ensure that there are no breaks in the program.

2 In order to disable the break key all entries are strings (keyed by error catching routines). 3 Lines 0 to 40 check that the entry is a number, and reject anything else except a decimal point.

4 The PRG in line 010 sets a unused variable to drop the course and distance routine to prompt for next position. It is PRG00 on first loading the program.
5 In line 041 code T0 is used as I found that if T0 is a float will work if the T0 (array) is empty.

6 Line 1300 is 1210 change the mathematical angle which is measured from the X axis anticlockwise to a true bearing which is measured from the Y axis clockwise.

7 The PRG in line 2130 checks the number of lines left in the display file and goes to the subroutine which allows the screen to be cleared and the listing continues without displaying an error code.

8 In lines 080 and 020 I found that in some circumstances the result could be > 1 thus giving an error code as no angle has a cosine > 1. Hence these corrections.

Naturally, there is a great deal more that could be done but I feel that in BASIC the program is reasonably complete.

To develop the idea further I am currently working on a machine code program which will take data from various sources and produce a continuous estimated position taking into account sea and tide and leeway as well as poor steering.

Shipping lines?

Here follows a breakdown of the structure of the program.

| | |
|-----------|---|
| 0-40 | Selectors to check input is a number or decimal point |
| 100-040 | Program starts at line 000 which sets up the arrays to hold the navigational information, both as strings for printing and as values for calculation. |
| 040-060 | Input 0 then jumps to relevant parts of the program. |
| 060-1040 | Input "B" Simply the save routine from within the program thus making it self running on loading. |
| 1000-2170 | Input "A" Exchanges latitude Y and Y and then jumps to beacon entry routine at line 102. |
| 2000-2120 | Input "B" The routine for listing beacons already entered. |
| 060-067 | Input "C" Goes to check between three possible start positions for course and distance. |
| 120-200 | Entry subroutine for lat and long with error checking. |
| 060-070 | Input "D" Prints current status of position, course and speed and estimated position if any. |
| 300-080 | Input "E" Position along routes. This works by finding bearing and distance between beacons whose numbers are entered left to right and using an almost dead-on trigonometric version of the geometrical construction used for navigational sextant angle position fixing, finds the vessel's position. |
| 1230-1284 | Updates the current position in the arrays and if a fix or assumed position, clears the estimated position along array by GOSUB 1350. |
| 1010-1080 | The routine which clears the estimated position along array. |
| 040-070 | Works out estimated position from time steps and course and speed. |
| | This routine is also used if a course from an estimated position is asked for. The program, working out the estimated position, then asking for the destination and, finally, jumping to the course the distance finding routine at line 004, after entering the estimated position at the appropriate string at line 1220. |
| 100-110 | Input "F" The beacon entry and consecutive numbering routine. |

Variables used

| | |
|-----|---|
| Y | Keeps count of the last beacon entered |
| V | Used to hold the value of Y when clearing an existing beacon. |
| L0 | Latitude |
| 00 | Longitude |
| C0 | Course |
| C1 | Both course and speed |
| VAR | Used to differentiate between fixed and estimated positions for data storage. |
| PRG | Used similarly for GOTO instructions. |



```

5 INPUT X#
10 FOR M#1 TO LEN X#
20 IF CODE X#(M)137 OR CODE X#
M#137 THEN GOTO 5
30 NEXT M
35 IF X#="" THEN GOTO 3
40 RETURN
100 CLR
101 PRINT AT 14,0;" IF YOU HAV
E FINISHED ENTERING BEACONS ENTE
R 100, OTHERWISE "
102 PRINT "ENTER BEACON LATITUD
E BEACONS"
103 GOSUB 5
104 IF VAL X#100 THEN GOTO 400
105 GOSUB 130
106 LET Y=Y+1
107 LET L=VAL X#
108 LET X=VAL X#
109 IF Y=Y THEN LET Y=Y
110 GOTO 100
115 GOSUB 5
116 LET L=VAL X#
118 IF L>90 OR L<0 THEN GOTO
120
140 PRINT AT 20,0;"ENTER MINUTE
E "
145 GOSUB 5
150 LET L=VAL X#
152 IF L>=60 OR L<0 THEN GOTO
145
160 PRINT AT 20,0;"W OR S ?
"
170 INPUT W#
175 IF W#(1)"N" AND W#(2)"W" THEN
GOTO 170
180 PRINT AT 20,0;"ENTER LONGIT
UDE BEACONS "
185 GOSUB 5
190 LET S=VAL X#
195 IF S>180 OR S<0 THEN GOTO
185
200 PRINT AT 20,0;"ENTER MINUTE
E "
205 GOSUB 5
206 LET S=VAL X#
210 IF S>=60 OR S<0 THEN GOTO
205
215 PRINT AT 20,0;"M OR S ?
"
220 INPUT X#
225 IF X#(1)"E" AND X#(2)"W" THEN
GOTO 220
230 PRINT AT 20,0;" LAT "L(0);
"LONG "L(1); "LONG "L(2); "LONG"
"X#
231 PRINT "IS THIS CORRECT ? EN
TER Y OR N"
235 LET L=L+S*LH/60

```

```

236 IF L<0 THEN LET L=-L
240 LET S=S+S*LH/60
241 IF X#(1)"W" THEN LET S=-S
245 INPUT X#
247 IF X#(1)"Y" AND X#(2)"M" THEN
GOTO 248
250 IF X#(1)"N" THEN PRINT AT 20,
0;"
"
251 IF X#(1)"M" THEN GOTO 125
255 RETURN
300 PRINT AT 14,0;"ENTER","NUM
BER OF LEFT HAND BEACON"
305 GOSUB 5
310 LET BL=VAL X#
320 PRINT "NUMBER OF CENTRE BEA
CON"
325 GOSUB 5
330 LET BC=VAL X#
340 PRINT "NUMBER OF RIGHT HAND
BEACON"
345 GOSUB 5
350 LET BR=VAL X#
352 IF BL<0 OR BC<0 OR BR<0 THE
N GOTO 345
360 PRINT "WAIT ONE MOMENT"
365 LET BL=ABS(180-L(1))-L(100)
370 LET BL=ABS(180-L(1))-L(100)
375 LET BL=ABS(180-L(1))-L(100)
380 LET B=BR+ABS BL+BL+ABS S
BL+BL
385 LET DELA=DELTA
386 IF DELA<0 THEN LET DELA=-1
390 LET AP=ABS (DELA+DELA)
400 IF L(1)<L(2)) THEN LET AP=
340-W#
405 LET BL=ABS(180-L(1))-L(100)
410 LET BR=ABS(180-L(1))-L(100)
415 LET B=BR+ABS BL+BL+ABS S
BR+BR
420 LET S=BR+ABS BL+BL+ABS S
BR+BR
425 LET S=BR+BR+R
426 IF S<0 THEN LET S=0
430 LET SF=ABS (DELA+DELA)
440 IF L(1)<L(2)) THEN LET SF=
340-E#
441 LET TIME=1
445 GOSUB 340
450 GOTO 1000
460 PRINT AT 20,0;"ENTER TIME I
N 24 HOUR CLOCK "
465 PRINT "
"
465 GOSUB 5
466 IF LEN X#4 THEN GOTO 545
470 LET T=(TIME)-X#
475 RETURN
480 PRINT AT 20,0;"ENTER SPEED
IN KNOTS "

```

ZX SIMULATION

```

585 GOSUB 5
590 LET C=12+XB
595 CLR
599 RETURN
600 GOTO 400
605 PRINT "ENTER",, "P TO FIND B
ESTIMATED POSITION  B TO DISPLA
Y CURRENT STATUS  C TO FIND C
OURSE AND DISTANCE", "A TO ALTER
A BEACON", "E TO SAVE TO TAPE ",
"E TO LIST BEACONS ", "R TO ENTER
BEACONS", "F TO GO TO POSITION F
INDING MODE"
610 INPUT XB
615 IF XB="C" AND PEEK 16417=2
THEN GOTO 765
620 IF XB="B" THEN GOTO 4000
625 IF XB="A" THEN GOTO 3000
630 IF XB="B" THEN GOTO 3000
635 IF XB="C" THEN GOTO 750
640 IF XB="E" THEN GOTO 100
645 IF XB="D" THEN GOTO 800
650 IF XB="F" THEN GOTO 300
655 IF XB="R" THEN GOTO 840
660 GOTO 400
665 CLR
670 PRINT "BEACONS SELECTED ARE
NOT LISTED LIST BEACONS"
675 PAUSE 300
680 GOTO 400
685 LET BL=L1511
691 LET BL=L1511
695 CLR
699 LET VAR=0
704 LET POS=0
709 PRINT AT 0,0;"IS DESTINATION
N"AT 0,0;"LET "L1511;"LOAD "
01415 AT 0,0;"ENTER YES / NO"
714 INPUT XB
719 IF XB="YES" THEN GOTO 715
719 IF XB="NO" THEN GOTO 495
720 CLR
725 PRINT AT 14,0;" ENTER LATIT
UDE OF DESTINATION DEGREES,"
730 GOSUB 125
734 LET L=14;"STR$ L$+" "+STR$
LH+15
739 LET GH=14;"STR$ GH+" "+STR$
GH+15
744 LET L1541=L
749 LET B1541=0
754 IF L1541=0 THEN GOTO 761
759 LET L=L1541
764 LET B=B1541
769 PRINT AT 14,0;"I WILL ONLY
BE A BEACON"
770 LET BL=BL-L1541
775 LET BL=40410-BL1541

```

```

01751/11504P1)
780 LET D15=500 (ABS D15+42+ABS
D63+42)
785 LET C0=ABS (ABS/D15+4150/P1
790 IF D15<0 THEN LET C0=340-C0
795 LET C0=C0
799 LET C0=30-C0
799 IF C0=0 THEN LET C0=340-340
799 LET C0=110-STR$ INT (C0+.5)
799 CLR
799 PRINT "YOUR COURSE IS "INT
(C0+.5)" DEGREES."
799 PRINT "DISTANCE "INT D15)
, "INT (1220-INT D15/100)" NM
BS"
799 IF VAR=2 THEN PRINT "FROM B
ESTIMATED POSITION TO DESTIN
ATION"
799 IF VAR=2 THEN GOTO 745
799 LET Z=999
799 GOSUB 1351
799 GOTO 1300
799 LET VAR=0
799 GOTO 809
799 CLR
799 PRINT "ENTER LATITUDE OF PR
ESENT", "POSITION, DEGREES,"
799
799 LET VAR=0
799 GOSUB 125
799 LET L=L1511+L
799 LET D1511=0
799 LET BL=L
799 LET GH=0
799 LET L=11;"STR$ L$+" "+STR$
LH+15
799 LET GH=11;"STR$ GH+" "+STR$
GH+15
799 LET TIME=1
799 GOSUB 560
799 GOTO 695
800 CLR
801 PRINT AT 0,0;"POSITION AT "
+STR$(1) +" HOURS "
802 PRINT
803 PRINT "LATITUDE " +L4011
804 PRINT
805 PRINT "LONGITUDE " +GH11
806 PRINT
807 PRINT "COURSE " +C0+11+"SPS
EE "+C0/10+" KNOTS"
808 PRINT
809 PRINT "ESTIMATED POSITION A
T "+TR$(1) +" HOURS"
810 PRINT
811 PRINT "LATITUDE " +L412)
812 PRINT
813 PRINT "LONGITUDE " +GH12)
814 PRINT

```

ZX SIMULATION

```

813 PRINT "TO RETURN TO INDEX 8
HERE I "
814 INPUT XB
817 GOTO 800
840 CLR
841 IF CODE TR11=0 OR CODE CR1
11=0 OR L121=0 AND L131=0 THEN
PRINT "NO START POSITION OR COUR
842 IF CODE TR11=0 OR CODE CR1
11=0 OR L121=0 AND L131=0 THEN
GOTO 800
843 IF CODE TR11=0 OR CODE CR1
11=0 OR L121=0 AND L131=0 THEN
GOTO 800
844 LET TIME=0
847 GOSUB 840
850 LET T2=VAL TR12,1 TO 21:VAL
L TR12,2 TO 40:VAL
853 LET T1=VAL TR11,1 TO 21:VAL
L TR11,2 TO 40:VAL
860 IF T2<T1 THEN LET T2=T2+24
865 LET THT2=T1
866 GOSUB 840
870 LET DEL=VAL CR12:HTM
874 LET DL=L(51)+DEL:RSH (DL/1
800FI1/60)
877 LET GO=8(501)+L(12)STOCB (CU
/180*PI)/COS (DL/180*PI):VAL
878 LET VAR=0
879 GOTO 1004
900 DIM L(40)
901 DIM S(40)
902 DIM T(4)
903 DIM C(4)
904 DIM TR(4,4)
905 DIM CR(4,4)
906 DIM LR(4,16)
907 DIM SR(4,16)
908 LET V=0
909 LET VAR=0
910 LET T=0
911 LET P03=0
940 GOTO 800
950 CLR
951 PRINT "DO YOU WANT COURSE A
ND DISTANCE?"
952 PRINT AT 1,0;"FROM PRESENT
POSITION"
953 PRINT AT 2,0;"PLEASE ENTER
Y OR N"
957 INPUT XB
958 IF XB="Y" THEN GOTO 963
959 PRINT AT 1,0;"FROM LAST FIX
?"
960 INPUT XB
961 IF XB="Y" THEN LET P03=1
962 IF XB="Y" THEN GOTO 800
963 PRINT AT 1,0;"FROM ESTIMATE
D POSITION?"
964 INPUT XB

```

```

965 IF XB="Y" THEN LET P03=2
966 IF XB="Y" THEN GOTO 840
967 GOTO 950
1000 CLR
1001 PRINT "ENTER LINE HORIZONTAL
ANGLE DEG."
1002 GOSUB 8
1003 LET H=VAL XB
1004 IF H<0:179 OR H>0 THEN GOTO
1000
1005 PRINT "ENTER MINUTES"
1006 GOSUB 8
1007 LET M=VAL XB
1008 IF M<0:40 OR M>0 THEN GOTO
1007
1009 PRINT H;" DEG. "MM;" MIN"
1011 LET H=H+M/60
1012 PRINT "ENTER RSH HORIZONTAL
ANGLE DEG."
1013 GOSUB 8
1014 LET R=VAL XB
1015 IF R<0:179 OR R>0 THEN GOTO
1013
1016 PRINT "ENTER MINUTES"
1017 GOSUB 8
1018 LET M=VAL XB
1019 IF M<0:40 OR M>0 THEN GOTO
1017
1020 PRINT R;" DEG. "MM;" MIN"
1021 LET R=H+R/60
1022 PRINT "I AM WORKING IT OUT."
"
1024 LET S=PI/180
1040 LET SP=S/125:SN (SP*PI)
1050 LET SO=S/125:SN (SP*PI)
1060 LET PR=SP*SN (180+PO-M+40)
1070 LET PE=SP*SO (180+PO-M+40)
1080 LET SR=SO*SN (180+PO-M+40)
1090 LET SE=SO*SO (180+PO-M+40)
1100 LET C=SN (11.455) SN-M*PI:40
21:11.455 (SE-PE):882:1)
1110 LET TR=ACB (1082+SP*PE2-SP
82:125*SO*PI):160/PI
1120 LET SP=SP+270-180:28TH
1125 LET SP=ABS (ET-SP)
1130 IF SP<180 THEN LET SP=360-X
P
1135 IF (180-H-M)>SP THEN LET SP
=SP+28TH-90-M
1140 IF SP<0 THEN LET SP=SP+360
1150 LET NORTH=PR+SP*PI (M*PI)
1160 LET EAST=PE+SP*SO (M*PI)
1170 LET D=SR (1155 NORTH+40):1
455 EAST+40)
1180 LET SP=ABS (EAST/0.0180/PI
1190 IF D<NORTH=-1 THEN LET SP
=360-SP
1200 LET SP=90-SP
1205 CLR

```

```

1210 IF BP=0 THEN LET BP=360*PI
1214 PRINT AT 14,0;"BCM LHA  
BCM RHA BCM"
1218 PRINT ELITAR 71*INT (IN1000)/  
7100,BC1AR 21*INT (IN1000)/710  
91AR 301AR
1220 PRINT "YOUR POSITION IS ",  
,"FROM BEACON NUMBER "120,,"SEA  
KING "INT (BP/0.511) "DISTANCE "  
"INT 31","INT 410*INT 51000011"  
"MILES"
1221 LET 18=" "
1222 LET KB=" "
1223 LET VAR=1
1225 IF 50N CLINE1=NORTH/501=-1  
THEN LET 18=" "
1224 IF 50N CLINE1=EAST/501=-1 T  
HEN LET KB=" "
1226 LET DL=LINE1-NORTH/50  
1228 LET 50=CLINE1-EAST/501 CL  
INE1/1000PI1/501
1224 LET L1VAR=501=DL
1227 LET 51VAR=501=50
1240 LET BP=CL-INT DL+50
1245 LET 51=VAR=50
1270 LET BP=CL-INT CL+50
1295 LET L1VAR1=STR INT DL=" "
129 "STR INT 1001001/1001+18
1290 LET 51VAR1=STR INT DL=" "
129 "STR INT 1001001/1001+KB
1292 FOR 14417,0
1293 IF VAR=1 THEN GOSUB 1300
1294 IF VAR=2 AND FOR=2 THEN GOT  
O 1294
1295 GOTO 501
1300 PRINT AT 30,0;"ENTER C TO C  
ONTINUE "
1305 PRINT AT 31,0;" "
1310 INPUT KB
1320 IF KB<"C" THEN GOTO 1320
1325 IF KB="C" AND 21Y THEN GOTO  
1340
1330 GOTO 500
1350 LET 5111=" "
1351 LET 5121=" "
1353 LET 7111=" "
1354 LET 1111=" "
1355 LET 5121=" "
1360 RETURN
2000 CLS
2010 IF Y1 THEN GOTO 3000
2100 PRINT "ENTER NUMBER OF BEAC  
ON YOU WISH TO CHANGE"
2110 GOSUB 5
2120 LET Y1=AL KB
2130 IF Y1 THEN PRINT "NO SUCH  
BEACON TRY AGAIN"
2140 IF Y1 THEN GOTO 3110

```

```

3100 LET Y1Y
3160 LET Y1=AL KB-1
3170 GOTO 102
3000 CLS
3005 IF Y1 THEN PRINT "THERE AR  
E NO BEACONS"
3010 IF Y1 THEN GOTO 400
3020 PRINT AT 0,0;"BEACON LATITU  
DE LONGITUDE"
3030 FOR 1=1 TO Y
3040 LET Y1=" "
3050 LET KB=" "
3060 IF 50N L111=-1 THEN LET Y1=  
" "
3070 IF 50N 5121=-1 THEN LET KB=  
" "
3080 LET L1=AR L111
3090 LET 51=AR 5121
3120 PRINT 11 "INT L1" 50  
N "INT 11-INT L1+501.5119*INT  
51" 50 "INT 11-INT 51+501.51  
119
3120 IF PEEK 14442<5 THEN GOSUB  
3150
3140 NEXT 1
3145 GOTO 1300
3150 PRINT "ENTER C TO CONTINUE"
3155 INPUT KB
3174 CLS
3180 PRINT AT 0,0;"BEACON LATITU  
DE LONGITUDE"
3185 RETURN
4000 CLS
4005 PRINT "SET TAPE RECORDER TO  
RECORD AND PRESS NEWLINE"
4010 INPUT 54
4015 SAVE "AR1.FIX"
4020 FOR 14417,2
4025 CLS
4030 IF PEEK 14404+2544*PEEK 1440  
5+14509/11000 THEN GOTO 400
4035 CLEAR
4040 GOTO 900
5999 PRINT PEEK 14404+2544*PEEK 1  
4405-14509

```



University Software

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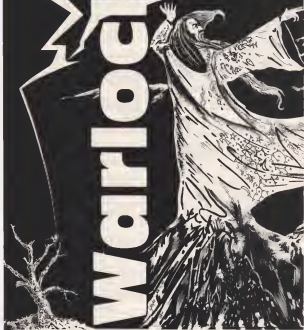
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Warlock





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27. The *Journal* reports that the Chemistry department is now going under a plan of "Academic Control" (1991). The rules are: "Each Worker has received 1 for the last four years, and every worker is receiving 1. Each is still a highly educated person."

[illegible]

On the night of the attack, he had just been told by a friend that there was a disturbance some 100 ft from the gate. Hearing the loud bangs, he went back to the gate, where he found a group of men, some of whom were armed. He saw one of the men shoot a bullet at the gate, which was closed. He then saw a man run away, and he followed him. He saw the man run off the road.

[illegible]

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

graduating and find that the road
was not a good one. The
very first morning in June, he
told of his own and other
people's experiences with
the road. He told of his own
experiences with the road, and
of the experiences of others.

[illegible]

the following information is required for the company to be able to provide the service:

all the foregoing, with the one
great reason, that the great
majority of the nation, all the nation
except a few, will not consent to
have any more of this government
with its President, its Congress,
its courts, its judges, its laws.

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[illegible]

| Year | Population | Population | Population | Population |
|------|------------|------------|------------|------------|
| 1990 | 100 | 100 | 100 | 100 |
| 2000 | 100 | 100 | 100 | 100 |
| 2010 | 100 | 100 | 100 | 100 |
| 2020 | 100 | 100 | 100 | 100 |
| 2030 | 100 | 100 | 100 | 100 |
| 2040 | 100 | 100 | 100 | 100 |
| 2050 | 100 | 100 | 100 | 100 |
| 2060 | 100 | 100 | 100 | 100 |
| 2070 | 100 | 100 | 100 | 100 |
| 2080 | 100 | 100 | 100 | 100 |
| 2090 | 100 | 100 | 100 | 100 |
| 2100 | 100 | 100 | 100 | 100 |

Always wearing protective earplugs, may result in a hearing loss (hearing loss may be temporary or permanent). Hearing loss may occur if strength training is done in a noisy environment, especially when the volume is turned up.

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5) *Staphylococcus aureus* (Gram positive, yellow, large, cocci in pairs and chains) was the most common. *Staphylococcus aureus* is the most common cause of skin infections.



Variables

1. The following are 0-dimensional arrays, READ from DATA.
- nk(0..5) The name of each monster (and Wizard)
 - sl(1..5) The three locations found (door, hallway, stairway)
 - sl(1..3) The three small creatures into which the Wizard may turn you.
 - rs(0) The resistance of each monster to your blows
 - rs(1) The resistance of each monster to wizard's successful blows.
 - gl(1) The value by which your Hero coefficient is increased

when you beat each monster and the length of each monster's name (for calculation in lines 5080 and 5110)

- sl(1..5) The length of the SBLPs in line 4000
- sl(1..1) The length of the SBLPs in line 4000

2. The following are 'single' variables.
- hi High Score - carried forward to successive games ($hi = hi^*$)
 - hr Hero-rating - or overall score in each game
 - hq Hero-quotient - increased by defeating monsters (by a randomly-adjusted value of 'q')
 - sd The number of minutes passed
 - st The force of your blow when you hit a monster (randomly selected)
 - ss The value by which a successful blow reduces the monster's endurance
 - sn Random value (1 to 5) to select monster from nk (jerk), and associated values of rs , h^* and h
 - ss Your strength, initially 500 - reduced by fighting or bumping your head - increased by resting
 - st The value by which 'ss' is reduced when you bump your head (randomly selected)
 - ts The maximum amount of treasure to find (between 1500 and 2500 - randomly selected)
 - tr A logic variable to change course of program when 'treasure' has been reached. It prevents more treasure being found and allows you to leave from line 1820 if you are on level 0
 - ts The amount of treasure you possess
 - ts The amount of treasure found each time
 - ts The number of lives in your possession
 - ts Random value (1 to 3) to select all and direct GO SUB in line 140
 - ts The level (floor) which you are on
 - ts Used in lines 400 to 480. $ts = +1$ 'up' and $ts = -1$ for 'down'. It also 'tr' and the pitch of the SBLP routine (line 480)

(*Your hero-rating is calculated by adding: $ts + (hr^*)^2 + (hi + 'ts')$ and is carried each time you change your location in the course of the program. 'r', 'q' and 'tr' are used as FOR NEXT variables for various purposes

Please note: 1 Unfilled random-values are used to direct some of the GO TOs
2 RND(1) is used for your responses to the various options offered you. This allows single-key entries to speed up operation of the game. However, RND(5) and SBLPs have to be used to slow down the display

Program description

- Line 20 Initialise High Score for successive games
- Lines 30 to 80 Initialises each game routine controlled by calling subroutine S990 to S400
- Lines 100 to 180 'Core-routine' in which all other routines return. Selects and PRINTs locations and directs GO SUB for each
- Location lines 200 to 280 'Hallway' PRINTs and acts on options using GO TO S400-S405, or 500
- Lines 300 to 320 'Door' PRINTs and acts on options using GO TO S400 or S200
- Lines 400 to 480 'Stairway' PRINTs and acts on options, routine complete
- Response in 'Hallway' routine (line 500 to 580) Moves selected by RND(5), 'tr' in line 220. PRINTs all options (completed)

Line 800 "Expire" selected by INKEY's "1" in line 320, uses GO TO line 1880

Lines 700 to 780 "Status" selected by INKEY's "3" in line 320. PRINT's possession score what level you are on and returns to line 300 when you are ready.

Response to "Open" routine:
Line 800
Open selected by INKEY's "1" in line 320
Random chance of 100 TO 1800 close locked or 100 TO 1800 close open

Response to "Explore" and "Open open" lines 1000 to 1400
Lines 1000 to 1800: "Meet Monster" routine, Selects monster, PRINTS and sets on options to fight (GO TO line 2000) or run away (GO TO line 8800) or random chance of monster attacking gold in stead of fighting and if 18000 is even, random chance of 18000 using magic (GO TO line 1700)

Lines 1100 to 1180 "Find gold" routine, from line 1880 (skip from line 3100)
If monster's amount has not been found, calculates amount of each find (amount reduces in proportion to total already found). PRINT's amount found and increments gold score, then checks gold score against maximum

Lines 1200 to 1220 "Find key" routine from line 1880 (skip from line 3100)
Random chance of finding a key, or another location. If a key is found, PRINT's and increments one key to key score

Line 1300 (from 1880) "Find monster" routine. Uses lines 8000 to 8210 to complete routine

Lines 1400 to 1480 "Find rest" routine, random chance of finding rest or another location. If rest, then PRINT's (B/E's and increments strength score

Continuation of "Open" routine (lines 1800 to 1880) from line 800
Lines 1800 to 1880 "Open locked" routine checks if you have a key or not then GO TO 8000. If you have a key, then asks if you want to use it. If "Yes" GO TO 8800. If "No" then increments one from key score and carries on to line 8800

Lines 1600 to 1680 "Open open" routine, from line 1880 or line 800
PRINT's use 4100 for B/E's checks if you have finished and randomly selects GO TO line 1000, or 1100 or 1200 or 1300 or 1400

END routine (Lines 1700 to 2000)
Lines 1700 to 1770 Entry (the) routine (Warlock 'uses magic') from line 1000
PRINT's, selecting bit from array, uses line 1900 to 1950 to complete "Successful the" routine, from line 1870

Lines 1800 to 1880 PRINT's score and uses 1800 to 1950 to complete

Lines 1900 to 1980 "Hi score" and "Play again" routines, from line 1770, 1880 to 2000 increments High Score and asks if you want to try again. If "Yes" then goes to line 80 or if "No" then STOP

Lines 2000 to 2050 "Out of Strength" routine, from line 3010
PRINT's and uses line 1980 to 1990 to complete

Lines 2050 to 2070 "All treasure found" routine, from line 1140
PRINT's, sets high variable to be 1, returns to "core routine" (L 100)

Right routine (lines 3000 to 3130), from line 1080
Lines 3000 to 3040 Calculate the force of your blow, increments strength, checks to see if you injured the monster, if you did, then GO TO line 3080, if you did not, then goes to line 1080 for another try

Lines 3080 to 3130 Calculate how badly you hurt the monster, increments monster's endurance, if monster is still fit to fight, then returns to line 1080, if monster is not fit to continue then PRINT's statements "are-quaint", uses GO TO line 1100 or 1200 for reward

Line 3650 "Title" subroutine. PRINT's title, used by various parts of program to which it returns

Lines 4000 to 4600 BEEP routine (subroutine). Returns to "core routine" if GO TO 4000, etc is used

Lines 5000 to 5180 "Initiate routine" subroutine called by line 80
DATA array, B/E's array from DATA lines 7000 to 8000. PRINT's instructions and initialise variables, uses line 5500 to continue

Line 5600 GO TO/IF routine from various parts of program, returns to "Core routine" (1200)

Lines 6000 to 6060 Monitor treasure gold routine, from line 1040
PRINT's, increments gold score, PRINT's new gold score, checks if new gold score is below maximum and resets it if necessary

Line 6500 "Yell" routine from line 1810, 1840. Uses GO TO 8000 to continue "Lucky routine" from lines 320, 480, 1300, 1480 and 8100 - can run to 8200

Lines 8000 to 8210 Random chance of meeting another monster from lines 330, 430 and 8000

Lines 8800 to 8820 "Run away" routine from line 1070, PRINT's "Coward" and increments back-quaint - then random chance of

Line 8920 (a) Dropping gold score GO TO 8010 to decrement gold score and return to "core routine"

Line 8940 (b) being trapped returns to line 1080 or another try

Lines 9000 to 9060 SAVI routine, accessed by "BREAK" GO TO 9000

Further developments

- 1 A third dimension could be added to the program so that the "Move" routine, translates sideways, forwards or backwards, within a 3 dimensional array from a fixed entry point to a fixed exit point, maintaining the vertical dimension (Y) requirements to qualify for successful exit at line 1950. The exit point could be randomly generated in each game and added to the exit requirements at line 1950
- 2 A random value could be generated (any between 0 and 10) as the vertical dimension which "Y" would have to equal to qualify for successful exit at line 1950



```

10 FOR WARLOW
20 LET R=0
50 PAPER 0:INK 0:SPACE 3:1
LS
40 GO SUB 5000
100 LET sgn INT (RND 43)+1
210 CLS : PRINT " You find a "
skey!
120 LET skey=skey+skey
140 GO SUB 100+100*sgn
150 GO TO 100
200 PRINT " (1) Move (2) Explore
s (3) Status "
210 PAUSE 0: IF skey= "1" OR
skey= "2" THEN GO TO 210
220 GO TO 400+100*VAL skey
300 PRINT " (1) Down (2) Leave
"
310 PAUSE 0: IF skey= "1" OR
skey= "2" THEN GO TO 310
320 IF skey= "2" THEN GO TO
330
330 GO TO 2000
400 PRINT " (1) Up (2) Down
(3) Leave"
410 PAUSE 0: IF skey= "1" OR
skey= "2" THEN GO TO 410
420 IF skey= "3" THEN GO TO
2000
430 IF INT (RND 43) THEN PP1
MT " No way "up" AND skey
= "1"!"down" AND skey= "2
"!! GO TO 2000
440 LET sgn1 skey= "1"-(1-INT
RND 43)
450 LET skey=skey PRINT " G.R.
You are now on level "s1
460 FOR s=2 TO 30 STEP 2: TOPSE
R (INT (R/4)) STEP .05,400p: RES
T 4: BORDER 5: RETURN
500 PRINT " (1) Forward (2) Back (3)
Left (4) Right"
510 PAUSE 0: IF skey= "1" AND
INT (RND 43) THEN PRINT "
You can take a few more"" and
hurt your head!" GO SUB 4000: L
ET sgn INT (RND 43): LET sgn
sgn+100: PRINT "... ,ouch!"
520 PAUSE 50: RETURN
470 GO TO 1400
500 CLS : PRINT TAB 12:"STATUS
"
510 PRINT "You have!"

```

```

520 PRINT " TAB 7:"A sword and
shield"
530 PRINT " TAB 7:"Strength....
...."s1p
540 PRINT " TAB 7:"Gold coins..
...."s2p
550 PRINT " TAB 7:"Keys.....
...."s3p
560 PRINT " TAB 7:"Monsters Be
twe..."s4p
570 PRINT " TAB 7:"Hard ratings
...."s5p
580 PRINT " TAB 7:"You are on
level "s1: GO SUB 2000: GO TO
200
590 GO TO 1000+100*INT (RND 4
2)
1000 LET sgn INT (RND 43)+1
1010 CLS : PRINT " SUDSAL!"
" You seek the "s1s2s3
1020 FOR s=2 TO 21: STEP .04,10:
BORDER INT (RND 43): STEP .05
— 100 NEXT s: BORDER 0
1030 IF NOT INT (RND 43) AND
sgn THEN GO TO 1000
1040 IF NOT INT (RND 43) THE
R GO TO 4000
1050 INPUT "": PRINT " What do
you do""(1) H1 "s1"s5" AND s
400p"s6s7 AND sgn5"" (2) Ru
n away!"
1060 PAUSE 0: IF skey= "1" OR
skey= "2" THEN GO TO 1060
1070 IF skey= "2" THEN GO TO
2000
1080 IF skey= "1" THEN GO TO
3000
1090 IF s THEN PAUSE 50: RETUR
N
1100 LET sgn INT (RND 43000):
MT 1000+2000+100*s1+50
1120 PRINT " INK 41" You find "1
sg1" gold coins."
1130 LET skey=skey
1140 IF sgn 3= skey THEN GO TO
2000
1150 GO TO 4100
1200 IF INT (RND 43) THEN PAU
SE 50: RETURN
1210 PRINT " You find a key."
1220 LET skey=s1: GO TO 4100
1300 PRINT " Nothing there!" 0
0 TO 2000
1400 IF INT (RND 43) THEN SET
URN
1410 PRINT " You find some more
""s1" food and wine.""s2" Have a
eat."
1420 LET skey=INT (RND 430)

```

```

481 IF str=500 THEN LET str=500
1430 PRINT " 2222 2222 2222
2222 2222"
1440 FOR i=1 TO 3: REPEAT 10,0:40:
  REPEAT 0,0,-47: PAUSE 20: NEXT i
1450 PRINT "  Oh dear! Time to
  go!"
1460 GO TO 8000
1500 PRINT "  Door locked!" : GO
  SUB 4000: PRINT "....Have you a
  key?"
1510 PAUSE 50: IF key=1 THEN GO
  TO 6500
1520 PRINT "  Yes!" : PAUSE 20:
  PRINT "Do you want to use it?" :
  GOTO 1570
1530 PAUSE 0: IF INKEY$ < "y"
  AND INKEY$ < "Y" AND INKEY$
  < "n" AND INKEY$ < "N" THEN
  GOTO 1530
1540 IF INKEY$ = "n" OR INKEY$
  = "N" THEN GO TO 6500
1550 PRINT "  Yes.....Unlock it
  up" : LET key=1: PAUSE 20: PR
  INT "....."
1560 PRINT "  The door opens!"
1570 GO SUB 4100
1580 PRINT "  ... .. look!"
1590 IF key=1 AND key THEN GO
  TO 1590
1600 PAUSE 20
1610 GO TO 1050-1059 INT i AND 4
  0
1700 CLS : GO SUB 3500
1710 PRINT "  TAB 0:THE BETTER E
  YES" TAB 0: "oooooooooooo"
1720 PRINT "  You eat your E
  as at the "
1730 PRINT "  heads of the W
  BLOP...." He turned you into
  a "1000 INT i AND 40:10"
1740 PRINT "  Your Hand-eating
  0 WAS "key"
1750 PRINT "  INK 4" You learn
  4 "1000" gold coins "
1760 GO SUB 4000: PRINT AT 17,1
  0:"ROM 600 IF": PAUSE 20: PRINT
  AT 17,14: " 1 AT 18,14:"ROM"
  : PAUSE 10: PRINT AT 18,14: "
  1 AT 18,14:"ROM"
1770 GO TO 1000
1800 GO SUB 3500
1810 PRINT "  TAB 0:"Congratulate
  00:"
1820 PRINT "  You've cheated t
  he Marlock"
1830 PRINT "  TAB 3:and his gets
  10"
1840 FOR j=1 TO 3: GO SUB 4100:

```

```

NEXT i
1850 PRINT "  INK 5" You learn
  "1000" gold coins."
1860 PRINT "  You have "10,0"
  Key:"1000" AND he 10 "100" left."
1870 PRINT "  You defeated "10
  00" Monsters,"
1880 PRINT "  Your Hand-eating
  "100" AND str=500:"100" AND str
  < 500:"100"
1890 IF str=500 THEN LET str=
  500
1910 PRINT AT 21,1:"Highest 500
  00:00"
1920 INPUT " 1: PRINT 60: TAB 7:"
  Another go ? (Y/N) ": PAUSE 0
1930 IF INKEY$ = "Y" OR INKEY$
  = "y" THEN CLS : GO TO 50
1940 IF INKEY$ = "n" OR INKEY$
  = "N" THEN STOP
1950 GO TO 1930
2000 GO SUB 3500
2010 PRINT "  You've run out o
  4 strength,"
2020 PRINT "  The Marlock has
  won again!"
2030 GO SUB 4000
2040 PRINT "  TAB 3:"Before you s
  100"
2050 GO TO 1800
2100 GO SUB 4100: CLS : PRINT "  A
  T 3,10:"WILL DONE"
2110 PRINT "  TAB 3:"You have 10
  and all of "
2120 PRINT "  TAB 3:"the Marlock"
  s treasure"
2130 PRINT "  TAB 3:"Now get out"
  : PAUSE 20: PRINT "  -if you can
  10"
2140 PRINT "  TAB 3:"You are on
  level "100"
2150 PRINT "  TAB 3:"The way L.L
  10 through "
2160 PRINT "  TAB 3:"a door or 10
  00"
2170 PAUSE 20: PRINT "  TAB 10:
  "Good 10,0"
2170 LET str=10: GO TO 2000
2200 LET str=INT i AND 40:10
2210 LET str=INT i AND 40:10
  0:10: IF str=10 THEN GO TO 200
  0
2220 IF str=10 THEN GO TO 305
  0
2230 PRINT "  You didn't hurt th
  e "1000"
2240 GO SUB 4000: GO TO 1000
2250 LET str=10:10:10
2260 PRINT "  You lost the " 10
  0 100 " 30:10" You frustrated to

```


Bookshelf

Patrick Cain once more puts on his thinking cap, stokes the log fire and settles down with three new books.

The Joy of Computers — Peter Laurie

Don't push off to fetch your Osborne plans, but I must admit that the life of a reviewer can be a dull and arduous one. Long before those witty well-penned testimonials ever reach the page there are periods of intense self-doubt and doubts to be gone through, lifting and lifting, until by the time you get to the page of KEY memory addresses and almost legible program listings. Of course it really is all fun and I love it, but sometimes I have to enjoy than others and reading 'The Joy of Computers' was one of those times. Published by Hutchinson and written by Peter Laurie, an editor of *Practical Computing*, the 200 pages, many of them with superb colour illustrations, are there to give a joy to read.

A VDU screen on the cover shows a picture of a window opening to a country scene with green fields and trees and a golden sun setting between two mountains (maybe the book should have been called 'The Joy of Landscapes'). Opening the cover and turning to the introduction on page seven gives a clue to the strange cover subject. Peter Laurie speaking of the intention of his book says "I can only open windows into a world of fascinating gardens. I hope my readers will think it worth while to go on into them." His treatment of these gardens on the pages inside the book is as effective as the garden picture on the glossy hardbound cover is pretty.

The publishers have aimed 'The Joy of Computing' at anyone who has just bought or is about to buy their first computer. It is my belief that



its appeal will be broader than this. The text is not pertinent to any particular computer, rather it introduces, in non-technical language how computers work, how they can and are being used, and attempts to explain the future that they are already making reality. Throughout the text is enlivened by brilliant colour illustrations.

Subdivided into four sections, the readers can read from start to finish or fit home sections to section as takes his fancy. No previous knowledge of computers is required.

Section 1, 'The Computer' looks at the micro, delving below the keyboard to identify the working bits — memory and processor, systems, chips, gates and buses, offering easy to understand descriptions of the details. It then moves to those parts above the keyboard: screens, printers and plotters and magnetic memory and gives an equally effective description of their workings and uses. The picture of the micro is completed by a discussion on software, home software games, file and operating systems. Should the text seem a difficult path well, that of being comfortable to someone other people and yet interesting to those of us who like to think we know a bit about such things, I must say why to say that the theory and the many examples of applications filled in a large piece of background for me.

Charged with this new knowledge I hasten to turn to Section 2, 'Programming'. This title at first might deceive. Nonsensical in its programming knowledge, it is not a comforting one. Part 2 deals with programming from a basic discussion through to fractals — the study of irregular shaped objects, covering on the way, BASIC, Structured Programming, Machine Code, 'Doff's Law' and some other things I had never heard of. I felt quite uncomfortable. Again the discussion was informative and yet not technical, I felt I had been introduced to some new ideas and new programmes should find plenty of useful discussion.

The world of 'Professional Computing' is put under the microscope in Section Three. Even amongst these who work in commercial computing there are a few with such a



wide overview. Of course computer technology is part to such widespread use that any detailed study would be beyond the scope of any one volume, but Mr Laurie's success has been to select suitable applications that help put the state of the art into perspective. The background

provided is broad and intriguing with interesting information 'Busted! Software', 'Data Best Managers', 'Image Processing', 'Talking Computers', 'Robots', 'Audiovisual' and 'The Electronic Office' are only a few of the topics looked at.

The structure, uses and applications of computers

today and a look at the implications of computer technology in the future are all covered in the final section called 'Progress'. This section examines the 'Revolution in Thinking' that is taking place, 'Current Trends', 'Hardware Advances' and asks 'What Next?' and 'Where will it End?' On the last two questions Peter Laurie has been wise enough to outline the likely trends, but not attempt to colour these particular questions.

'The Joy of Computers' may be aimed at those who already have or are about to buy a home computer but to my mind it is a book for anyone who has an interest in modern world. Peter Laurie has covered the windows onto a number of computer gardens so successfully that most readers are likely to be encouraged to do further digging themselves.

'The Joy of Computers' by Peter Laurie is published by Hutchinson and is a gift worth treating yourself to at £3.99 ISBN 0 09 153 068

30 Programs for the ZX Spectrum and 16K ZX81 — 5 Doly

I have often in the past saved on these pages about the quality of books published by Bantam Publishing. The books are economical and although small are filled with advice and information of good value that is logically laid out and written with the reader in mind. '30 Programs for the ZX Spectrum and 16K ZX81' certainly does not suggest a novel approach to computer books. Now Bantam does this Bantam Publication, written by 5 Doly, stand up against the many similar titles available?

Often such books aimed at more than one machine appear to consider only one and look at others as an afterthought. I was grateful to find that here this was not so. All the programs contained could be readily loaded onto other systems, including the use of PEEK/POKE, machine code routines and various graphics symbols that are peculiar to particular machines.

As the author points out, most of the programs are accompanied by flow charts detailing the logic of each program and enabling conver-

sion to coding forms for other machines. Flow charts too are helpful to less experienced programmers giving guidance on program development and structure while more experienced users can clearly follow the logic in order and can modify or improve the program as desired — rather like clearing away the forest to expose the wood. Each chapter is further supported by a short but precise descriptive text, many other books lay greater emphasis on these parts, including in them an almost line by line description of the programs offering detail of all but the barebones. However Mr. Daly's style: I found the mode to be at times a little too brief and often wished for further description of the language, but for the most part they were adequate.

If the programs, I may well be that the author didn't have to say too much about them anyway. Not because the flow charts were sufficient but because in most cases the program didn't require them. There were no sections of programs: two games sections e.g. *Bravo*, *Pontoon*, *Ballistic*, *Ballistics*, a section on filing systems, some mathematical programs and sections of statistics. There were also a chapter on working out working times, *Apple*, *Start* programs. Unfortunately like the file, few of the programs were novel. *Warrior* to *General* or *General* to *Warrior* programs are ten a penny but to be fair the examples included here were of a high quality and represent a good allocation of basic programs for the new user.

Throughout the book the author has taken pains to ensure that the programs are legible and as is typical of *Self-Instruct* all listings were aligned from print to ensure their accuracy. Experienced users are unlikely to find too much of any benefit in this well compiled little volume but to the host of new users who should have recently joined us, the twenty programs included should prove to be worthwhile and act as useful guides to developing and improving their own programming ability.

20 Programs for the ZX Spectrum and the MK2281 is written by S. Daly, published by *Radio Publishing* at £1.95 for over 110 pages, represents good value ISBN 0-85334-180-8



Self-instruct BASIC A practical guide — Antony & James Clark

It's said that first impressions give a long way, my first impression of this book certainly didn't take it any further than the first. As I opened the cover I thought: *'Self-Destruct BASIC'* might have been more appropriate for some reason the publisher, Pitman have bound the volume in a fashion similar to a secretary's shorthand pad. Don't get me wrong, with a bit more care, I began to form some initial impressions of the novel binding and the contents.

Once married, the cover proved to be a great success. This book, by father and son

authors Antony and James Clark, is intended to be a step by step guide to beginning on both the ZX Spectrum and the BBC Micro-Computer, and as a teaching aid the cover folds into a nearly accessible support for the reader. Having many times in the past all but lost comprehension trying to type a listing into the computer while being continually frustrated by losing my place on the page, I found this simple and effective solution most convenient.

But it's not a plain book by the cover alone, what of the text that is so adeptly supported? The book is aimed at beginners and assumes little more than that the reader has successfully set up the computer and played over the manual. I should dispute, however, that it is suitable for users as young as nine years, if for no other reason than that

they at such an age are likely to lose interest very quickly in such a tedious treatment of the problem. Readers who are serious indeed are intended, on completion, to be familiar with a full range of programming instructions and to be aware of their usefulness. The topics covered are simple, strong, efficient, rapid and elegant, with more randoms, FOR, NEXT loops, screen formatting and all commands necessary for their implementation. Also included are examples and hints on program writing and programming style.

New users will find that there is no shortage of books with similar material, so other than the novel binding, what have Antony and James Clark added to make this book worthy of any note? The strength of *'Self-Destruct BASIC'* is not the content, which is no more than might be expected in an elementary book, but the method of presentation. From what I can remember of the hours I have spent close to sleep at the back of a lecture hall as a student teacher, the technique has much merit.

In each section there is an introduction to the topic, an example of its use and a short discussion to highlight and reinforce the concepts. From that, there are suggestions for putting the newly discovered technique to use and questions to ensure that the theory has been properly learned. In the main though, this is a book to be used when sitting in front of the computer. Any computer user worth the title knows that hands on experience is the only way to develop skill — this book is intended to be used as a companion and guide while gaining that experience. It is well structured, concise in best programming and should be followed, as suggested in the order and out. To gain all the book has to offer the reader should be prepared to be a good student following that course and investigating the projects suggested. All that it has to offer is a good grounding in BASIC for both Spectrum and BBC users but that is no small task.

On first impressions *'Self-Instruct, BASIC'* may seem boring, but as you go to new users it has my backing!

'Self-Instruct Basic a Practical Guide' is written by Antony and James Clark, published by Pitman and costs £4.95 ISBN 0 273 02522X

Problem page



Our regular 'agony uncle', Peter Shaw, answers some more of your programming queries!

Thank you once again for your correspondence. I am always glad to help any readers with computer problems, although I am sure you understand that I cannot deal with every letter I receive. To start with, I have had about two dozen letters asking for the address of Fountain Computers Limited. I mentioned in a previous issue that Fountain produced a sheet called 'Improving the Spectrum Display by 15'. The sheet explains how to 'fine tune' your Spectrum to your television for the maximum video output, but the minimum dot clock. The method is not compatible with issue 3 machines. Fountain's address is, David Reed, Pooleton, Alcester Road, SO24 0BW.

Dear Peter
I am writing to ask you what the error upon code 1 means. For after typing in a program on my ZX81 which included machine code, this was displayed and it quite baffled me for it is not defined in the ZX81 manual. Please could you enlighten me.

Gordon Cross
Walsley
Wales

Dear Peter
This is a letter's letter as a crash. Usually with the message 'Z801', crash looks much more to me and modern-era mode, but this crash has somehow called the error report routine, and the report of the crash thrown out before the report subroutine has been

called in a non-standard way. What you need is a sheet of the program listing with the machine code you already have in your computer. This is probably where the problem lies.

Dear Peter
I would be pleased if you could print a copy of the 'Conversion Table' for converting Z801 PEEK values to that of the Spectrum.

In various books I have seen such tables for the Z801 PEEK values to the ZX81, but I have not yet seen one for the Z801 to Spectrum.

Although I have both the Spectrum and Z801 I much prefer the Z801 with 16K memory, as the programs devised for it are both short and sweet, not as long winded and bug ridden as Spectrum programs. That the Spectrum has replaced until I convert PEEK values from latter programs for it.

J.T. Giesch
Hull Green
Birmingham

Hi Clavin
I find your letters a challenge and not always as intended, but the necessary consequences. How they are for the first time, as you and I believe in print at last!

| Z801 | SPECTRUM |
|-------|----------|
| 18384 | 33810 |
| 18385 | 33811 |
| 18386 | 33812 |
| 18388 | 33750 |
| 18389 | 33817 |

| | |
|-------|---------------|
| 18389 | 33817 |
| 18389 | NO EQUIVALENT |
| 18389 | NO EQUIVALENT |
| 18389 | 18644 |
| 18400 | 33837 |
| 18400 | 33838 |
| 18404 | 33841 |
| 18406 | 33846 |
| 18408 | 33847 |
| 18410 | 33851 |
| 18412 | 33859 |
| 18414 | 33865 |
| 18416 | 33868 |
| 18418 | 33869 |
| 18419 | 33880 |
| 18420 | 33881 |
| 18424 | NO EQUIVALENT |
| 18425 | 33833 |
| 18427 | 33882 |
| 18428 | 33885 |
| 18430 | 33886 |
| 18432 | 33888 |
| 18434 | 33870 |
| 18436 | 33873 |
| 18438 | 33877 |
| 18439 | 33878 |
| 18440 | 33880 |
| 18441 | 33888 |
| 18442 | 33889 |
| 18443 | NO EQUIVALENT |
| 18444 | 33889 |
| 18477 | 33889 |

Dear Peter
I need today about Sinclair's new computer, the QL, in another publication. There are a few points which seem a little unclear, and I would be most grateful if you could clear up these problems for me.
I am told that the machine has 128K of memory; how much is available to the user? There is an 'industry standard' monitor output. What type of monitor suits it best, and how is it wired up? I have a ZX Microdrive, can I plug them

onto the QL? Finally, I have heard no mention of a cassette interface, and I cannot see one on the (partial) front of the QL. Is there a cassette interface and if so at what BALK rate does it work?

Thank you for your help.

Gerald Pryor
Hudd Green
Manchester

David
The QL does indeed have 128K of memory, when you are in the high resolution mode you have 64K left. This is what I am told, but not something I have checked for myself. The monitor output is an RGB interface, which is wired up as follows.

| |
|---------------------|
| 1 RED |
| 2 GREEN |
| 3 BLUE |
| 4 50VDC |
| 5 GND |
| 6 VIDEO (COMPOSITE) |
| 7 MONOCHROME VIDEO |
| 8 GROUND |

This should be compatible with most RGB monitors on the market providing you have the right cable.

Your ZX Microdrive, however, are not compatible with the QL. Sinclair have produced a slightly improved version of the Microdrive especially for the QL. As for your last question, as the QL doesn't have a cassette interface Sinclair feels that as it already has two drives built in you won't need cassettes. And good news for the independent software houses.

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References

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Should any student be involved in a lawsuit or other legal action?

[illegible]

Downloaded from <http://ajphaphysoc.org/> at University of California, San Diego on November 10, 2014

Abstract

Table 1

1000

EIN-08 für alle Internet
anmeldungen verwendet.

Conversion tips

A guide to ZX81/Spectrum program conversions from David Nowotnik.

The versions of BASIC offered by the two Z8 computers are so similar that many programs for one can be used by the other. The ZX81 has only two elements which are not present on the Spectrum, SCROLL and UNPLOT, and these should cause you few problems when converting ZX81 programs to the Spec-

trum (see Table 1).

There are quite a lot of commands and functions on the Spectrum which are not available on the ZX81. A list of these appears in Table 2. The stars indicate those commands and functions for which there is no simple translation to ZX81 BASIC. Those for colour and sound can be omitted

but you will have to find some alternative for the high resolution and File IO commands.

The command PLOT appears on both computers, but the effect is quite different, as shown. Another for PEEK and POKE should be used with caution. In conversion, addresses will almost certainly have to be changed. Some of those

changes appear in the tables. A somewhat nasty one POKE USR "v" on the Spectrum indicates User Defined Graphics. ZX81 users don't have this facility, so you'll have to omit this and use a standard character instead.

| ZX81 | Spectrum | Comments |
|------------|--|--|
| SCROLL | RANDOMIZE USR 32652 or LET I = USR 32652 | If the program uses random numbers, they could become rather predictable with the first option. If so, use the second, using a variable. In this case, I, which is otherwise not used. |
| PLOT X,Y | PRINT AT YI - YI2,XI2 | Print the appropriate quarter square graphics character. |
| UNPLOT X,Y | PRINT AT YI - YI2,XI2 | Print a space, or the appropriate quarter square graphics character. |

Table 1. ZX81 to Spectrum conversions.

| Spectrum | ZX81 | Comments |
|---|--|---|
| BIN eg LET x = BIN 10010101 | LET x = (decimal no.) Conversion to decimal 10010101 = 149 | BIN allows the representation of a number in binary. On the ZX81 use the decimal equivalent, but beware. BIN is often used with User Defined Graphics, which are not available on the ZX81. |
| READ/DATA eg READ x,y DATA 60,80 | LET LET X = 60 LET Y = 80 | READ and DATA are used to store a list of information in a program. Use LET instead. |
| DEF FN and FN eg DEF fn1 = SQR x LET y = FN x11 | LET X1 = "SQR x" LET X = 1 LET Y = VAL X1 | The defined function can appear in a string. Use the keyword for built-in functions (eg SQR). The equivalent of FN may need 2 lines, as shown. |
| PLOT | no equivalent | |
| SCREENS eg LET s = SCREENS x,y | LET A = PEEK PEEK 16385 = 255 * PEEK 16387 + 1 + Y * 32 * X | Used in interactive games to detect characters in the display file. Note - this formula only works when a RAM pack is fitted. |

Table 2. Spectrum to ZX81 conversions.

PROGRAMMING TIPS

Z801

1 RAMMER
POKE 18436,255
POKE 18437,255

LET T = (RAMMER - PEEK
18436) - 255 * PEEK 18437
:END

2 Line number zero

POKE 16816,0

3 RAMTOP

POKE 16388,X - 255 * INT
(X/255)

Spectrum

POKE 33673,0:POKE 33673,0

LET I = (POKE 33673) - 255 *
PEEK 33673:END

For times greater than 10
minutes, you can use byte
33674 as well

POKE 33768,0
(At the start of BASIC can
clear, eg with microdrive)
use with caution

CLEAR x

POKE 16388, INT (X/255)

Comments

Both computers have a counter
which accurately times by 50
every second. In this example,
use the first line to start the
clock. The variable T will
have the time in seconds after
the start. The counter can
only be used for 10 minutes

Converts the first line of a
program to line number zero
which cannot be edited, and
so is protected

Creates a safe area at the
top of RAM starting at address
x, for storing data, machine
code etc

Table 3 General Information/Notes

| | | | | | |
|---------|---|---------|---|---------|---|
| STOP | + | FORMAT | + | ATTN | + |
| REORDER | + | END | + | BN | + |
| BRIGHT | + | INVERSE | + | FM | + |
| CAT | + | MERGE | + | IN | + |
| CIRCLE | + | MOVE | + | OVER | + |
| CLOSE | + | OPEN | + | POINT | + |
| DATA | + | OUT | + | SCOREDB | + |
| DEF FN | + | PAPER | + | VAL | + |
| DRAW | + | READ | + | | |
| ERASE | + | RESTORE | + | | |
| FLASH | + | VERIFY | + | | |

Table 4 Spectrum functions not available on the Z801

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MACHINE SPECIFICATIONS

ZX80

Dimensions

Width 174mm (6.85 in)
Depth 210mm (8.26 in)
Height 35 mm (1.38 in)
Weight 300g (10.5oz)

Microprocessor/Memory

Z80A 3.25 MHz clock
ROM 4K bytes containing BASIC
RAM 1K bytes internal, externally expandable to 18K bytes

Display

Requires an ordinary domestic black and white colour TV. The lead supplied connects between the ZX80 and your TV's aerial socket. The display organisation is 24 lines of 32 characters per line showing block characters on a white screen. The ZX80 does not connect to a printer.

Programming

Programs can be entered on the keyboard or loaded from cassette. The ZX80 has automatic "wrap round" so lines of program can be any length but not multi-statement lines.

Syntax check

The syntax of the entered line is checked character by character. A syntax error cursor marks the first place the syntax breaks down if there is an error. Once any errors have been edited out, the syntax error cursor disappears. Only syntax error free lines of code are accepted by the ZX80.

Graphics

Total of 32 graphics symbols giving 48 x 64 pixels resolution consisting of 10 symbols plus space and inverse. Includes symbols for drawing bar charts. Under control of your BASIC program any character can be printed in reverse field lighting.

The line edit allows you to edit any line of program or input including statement numbers. The edit and control lines are EDIT, RUBOUT, HOME.

Arithmetic

Arithmetic operators +, -, x, / exponentiate. Relational operators <, >, =, <=, >=, <>, <=, >=, <>. Logical operators AND OR NOT including boolean result. Relational operators also apply to strings. ZX80 BASIC uses 16 bit two's complement arithmetic (i.e. 32767).

Variables

Normal variable names may be any length, must begin with a letter and consist of alphanumeric. Every character in the name is considered (thus an infinity of unique names is available).

String variables may be assigned to or from, displayed but not concatenated. String variable names are A\$-Z\$. Strings do not require a dimension statement and can be any length.

Arrays have a maximum dimension of 255 (256 elements each). Array names consist of a string letter A-Z.

Control variable names are FOR...NEXT loops consist of a single letter A-Z.

Expression evaluator

The full expression evaluator is called whenever a constant or variable is encountered during program execution. This allows you to use expressions in place of constants especially useful in GOTOs COSUBs FOR...NEXT etc.

Immediate mode

The ZX80 will function in the "calculator mode" by immediately executing a statement if it is not preceded with a line number.

Cassette interface

Works with most domestic cassette recorders. The transfer rate is 250 baud using a unique tape-recording format. Other systems are not compatible with the ZX80's. The ZX80 also SAV's the variables as well as the program on cassette. Therefore you can save the data for updating next time the program is executed. The ZX80 does not support separate data files. The lead supplied with the ZX80 is fitted with 5 lines jack plug.

Expandable bus

As the rear has 8 data, 16 address, 10 control lines from the processor and Gv, Gv, Gv, Gv, Gv and internal memory control line. These signals enable you to interface the ZX80 to your own electronics, ROM, CTC, SIO if you want I/O ports etc.

Power supply

The ZX80 requires approximately 400mA from 7-11V DC. It has its own internal 5V regulator.

TV standard

The ZX80 is designed to work with GNF. This includes 30 lines in the version required for use in the United Kingdom. The ZX80 USA is designed to work with a VHS. The American channel 2 (European channel 3) and is the version required for the American TV system, also for countries without UHF.

ZX81

Dimensions

Width 187mm (6.92 in)
Depth 175mm (6.89 in)
Height 40 mm (1.57 in)
Weight 380 gms (13.15 oz)

Microprocessor/Memory

Z80A 3.25 MHz clock
ROM Containing BASIC interpreter
RAM 1K bytes internal, externally expandable to 18K bytes

Keyboard

40 key touch-sensitive membrane. Using function mode and single press key word system. This gives the equivalent of 88 keys and also graphics mode allows an additional 30 graphical and 16 message mode characters to be entered directly.

Display

Requires an ordinary domestic black and white or colour TV. The usual lead supplied connects the ZX81 to the TV's aerial socket. The display is organised in 24 lines of 32 characters with block characters on a white background.

Two mode speeds

The ZX81 can operate in two software selectable modes: FAST and NORMAL. FAST is ideal for really high speed computing. In NORMAL mode however the ZX81 allows continuously moving, faster than animated display.

Printer

The ZX81 will permit instructions (LPRINT, LUST and COPY) to drive the Sinclair ZX Printer.

Programming

Programs can be entered via the keyboard or loaded from cassette. Programs and data can be saved onto cassette so that they

and not lost when the ZX81 is turned off.
Syntax check.

The syntax of a line of program is checked on entry. A syntax error (error marks the first place the syntax breaks down if there is an error. The syntax error or cursor disappears when errors have been corrected. Only lines free from syntax errors will be entered into the program.

Graphics

Apart from the 26 graphics characters, space and its inverse, the display may also be divided into 64 x 44 pixels, each of which may be 'coloured' in or 'united' out under program control.

Editing

A line editor allows you to edit any line of program or output, including program line numbers. Lines may be deleted, or changed or inserted in size.

Arithmetic

Arithmetic operators +, -, \times , \div , exponentiate. Mathematical operators <, >, <=, >=, < > >=, < > < >=, they compare strings and arithmetic variables to valid 0 (False) or 1 (True). Logical operators AND OR NOT valid boolean results.

Floating-point numbers

Numbers are stored in 5 bytes in floating-point binary form giving a range of 1.3×10^{-11} to 1.7×10^{11} accurate to 24 decimal digits.

Graphics functions

Natural keyboarding: SIN, COS, TAN and their inverses: SIN⁻¹.

Variables

Numbered: any letter followed by alphanumeric
String: A-Z, 0-9

FOR NEXT loops: A-Z, loops may be nested to any depth.

Numerical arrays

A-Z, 0-9

String arrays

A-Z, 0-9

Arrays

Arrays may be multi-dimensional with subscripts starting at 1.

Expression evaluator

The LIL expression evaluator is called whenever an expression constant or variable is encountered during program execution. This powerful feature allows use of expressions in place of constants and is especially useful in GOTO GOSUB etc.

Command mode

The ZX81 will execute statements immediately, enabling it to perform like a calculator.

Cassette interface

Works using cassette cassette recorder. The transfer rate is 250 baud and uses a unique recording format not compatible with other systems. The ZX81 will save the data as well as the program to avoid the need to reenter the data when the program is next loaded.

ZX81 will search through a tape for the required program.

The cassette (data supplied) have 3 1/2 inch jack plug.

Expansion card

As the ZX81 has the full data, address and control buses from the Z80A CPU as well as CW, +5V, +5V G and the memory address lines. These signals enable you to interface the ZX81 to the Sinclair 10K RAM pack and ZX printer.

Power supply

The ZX81 requires approximately 420mA at 7-8V D.C. It has its own internal 5V regulator. The ready assembled ZX81 comes complete with a power supply. The ZX81 kit does not include a power supply.

TV standard

The ZX81 is designed to work with UHF TVs (channel 36) 625 lines.

ZX SPECTRUM

Dimensions

Width 233 mm
Depth 144 mm
Height 90 mm

CPU/Memory

Z80A microprocessor running at 3.5 MHz. 128K-byte ROM containing BASIC interpreter and operating system.
128K byte RAM (also optional 320K byte RAM on internal expansion boards) in 488K-byte RAM.

Keyboard

40-key keyboard with upper and lower case with capitals lock feature. All 84-85 words obtained by single keys, plus 18 graphics characters, 22 colour control codes and 21 user-definable graphics characters. All keys have auto repeat.

Display

Memory-mapped display of 256 pixels x 192 pixels, plus one at 160x192 pixels per character square, defining one of eight foreground colours, one of eight background colours, combination of brightness and flashing or steady. Screen colour can also be set to one of eight colours. Will drive a PAL/NTSC colour TV set, or black and white set (which will give a standard grey, on channel 36).

Sound

Internal loudspeaker can be operated over more than 10 octaves (actually 130 semitones) via basic SOUND command. Jack sockets at the rear of computer allow connections to external amplifier/speaker.

Graphics

Point, line, circle and arc drawing commands in high-resolution graphics.

18 pre-defined graphics characters plus 21 user-definable

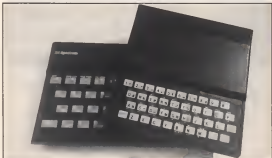
graphics characters. Also facilities to vary character of a given colour attribute at a given position (colours, brightness and flash) and whether a given position set. Text may be extended to screen on 34 lines of 32 characters. Text and graphics may be freely mixed.

Colours

Foreground and background colours, brightness and flashing, are set via BASIC INC, PAPER, BRIGHT and FLASH commands. COLOUR may also be set, which performs an exclusive — or operation to generate any printing or plotting that is already on the screen. IN VERGE will give direct video printing. These are commands may be set globally to affect all further PRINT, PLOT, DRAW or CIRCLE commands, or locally within these commands to cover only the results of that command. If they may also be set locally to cover that given by an INPUT statement. Colour control codes, which may be accessed from the keyboard, may be inserted into text or program listing, and when displayed will generate the globally set colours until another control code is encountered. Brightness and flashing codes may be inserted into program or text, similarly. Colour control codes in a program listing have no effect until a colour control code is set by a BORDER command. The eight colours available are black, blue, red, magenta, green, cyan, yellow and white. All eight colours may be present on the screen at once, with some direct flashing and others steady, and any area may be highlighted with bright.

Screen

The screen is divided into two sections. The top section — normally the first 22 lines — displays the program listing or the results of program or command execution. The bottom section — normally the last 22 lines — shows the command or program line currently being entered, or the program line currently being edited. It also allows the user messages. Full editing facilities of forward, cursor right, insert and delete (with auto repeat facility) are available over this line. The bottom section will expand to accept a current line of up to 22 lines.



Mathematical Operations And Functions

Arithmetic operations of $+$, $-$, \times , \div and raise to a power. Mathematical functions: sine, cosine, tangent and their inverses, natural logs and exponentials, sign function, absolute value function, and integer function, square root function, random number generation, and π . Numbers are stored as five bytes of floating point binary — giving a range of $\pm 3 \times 10^{-49}$ to $\pm 7 \times 10^{48}$ accurate to 8 1/2 decimal digits. Binary numbers may be entered directly with the BIN function — π , ϕ , e , $\ln 2$, $\ln 10$ and $\pi/180$ may be used to compare string or arithmetic values of variables to yield 0 (false) or 1 (true). Logical operations AND, OR and NOT yield true or false but will accept 0 (false) and any number (true). User-definable functions are defined using DEF FN, and called using FN. They may take up to 255 numbers and 255 string arguments, and may yield string or numeric results. There is a full DATA mechanism, using the commands READ, GATA and RESTORE. A real-time clock is definable.

String Operations And Functions

Strings can be concatenated with $+$. String variables or values may be compared with $=$, $<$, $>$, \leq , \geq , \neq , $<>$ to give Boolean results. String functions are VAL, VAL\$, STR\$ and LEN. CHR\$ and CODE convert numbers to characters and vice versa, using the ASCII code. A string string mechanism exists, using the form \$\$(n TO \$).

Variable Names

Numeric — any string starting with a letter (upper and lower case) are not distinguished between, and spaces are ignored.

String — A# to Z#.

FOR NEXT loops — A, Z.

Numeric arrays — A, Z.

String arrays — A\$ to Z\$.

Simple variables and arrays with the same name are allowed and distinguished between.

Arrays

Arrays may be multi-dimensional, with subscripts starting at 1. String arrays (technically character arrays, may have their last subscript omitted, yielding a string.

Expression Evaluator

A full expression evaluator is called during program execution whenever an expression, constant or variable is encountered. This allows the use of expressions in arguments to GOTO, GOSUB etc.

It also operates on comments allowing the ZX Spectrum to operate as a calculator.

Cassette Interface

A tone loader is required before the information by overping the automatic recording level. Fluctuations of some tape encoders, and a Schmitt trigger is used to remove noise on any data.

All saved information is stored with a header containing information on its type, date, length and address information. Program, address, blocks of memory, string and character arrays may all be saved separately.

Programs, blocks of memory and arrays may be verified after saving.

Programs and arrays may be merged from tape to combine them with the existing contents of memory. Where two line numbers or variable names coincide, the old one is overwritten.

Programs may be saved with a line number, where execution will start immediately on loading.

The cassette interface runs at 1500 baud. Through two 3 1/2 inch disk drives.

Expansion Port

This has the full data, address and control buses from the Z80A, and needs to interface to the ZX Printer, the RS232C and UART interfaces and the ZX Microdrive. RD and OUT commands give the I/O port equivalents of IN and OUT.

Z8001 Compatibility

Z8001 BASIC is essentially a subset of ZX Spectrum BASIC. The differences are as follows:

8.000 and 16.000: the ZX Spectrum operates at the speed of the Z8001 in FAST mode with the steady display of 8.000 mode, and does not include these commands.

SCROLL: the ZX Spectrum scrolls automatically, asking the operator "scroll?" every time a screen is filled.

UNLOAD: the ZX Spectrum can unload a disk using FLOPPY DRIVE and then activate UNLOAD.

Character set: the ZX Spectrum uses the ASCII character set, as opposed to the Z8001 non-standard set.

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